Glacier National Park
Ford Transportation Scholar
Final Report

Prepared for:
The National Park Foundation
National Park Service
Glacier National Park

Susan Law
Ford Transportation Scholar
June 2002 -September 2004

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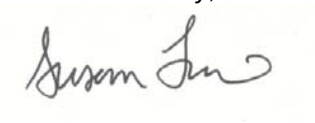
LETTER OF APPRECIATION

To the National Park Foundation, Park Service, Ford Motor Company, and my colleagues at Glacier National Park:

Thank you for giving me the unique opportunity to work on improving and promoting alternative transportation at Glacier National Park. I have learned so much from my time at Glacier – from understanding the importance of the "visitor experience" to recognizing the challenges of transportation planning for recreation and rural environments to how to tell the difference between a black bear and a grizzly! One of the most interesting aspects of my work has been maintaining the delicate balance of Park transportation needs with resource preservation and visitor access. The Ford Transportation Scholar Program was instrumental in catapulting me into a career path with the Federal Government, as I was hired by Glacier National Park to continue assisting the Park with Transit and Intelligent Transportation Systems (ITS) Plans soon after the grant ended. I have recently begun a job with the Federal Highway Administration assisting many National Parks as well as other Federal Lands with alternative transportation projects. This job was the perfect expansion of my skills – from assisting a single park to a whole region of parks. I hope the work I have accomplished at Glacier, documented in this report, will leave a legacy for preserving for future visitors the unique experience of the Going-to-the-Sun Road, whether in their own vehicle or on a shuttle. The memories I collected in the two years as a Ford Transportation Scholar at Glacier will stay close to my heart for the rest of my life. Thank you again!

Sincerely,



Susan Law

Introduction

According to the National Park Service, the mission behind transportation systems in parks is "to preserve and protect resources while providing safe and enjoyable access within the National Parks by using sustainable, appropriate and integrated transportation solutions." With increasing visitation, Glacier has experienced unacceptable levels of traffic congestion as well as parking shortages; elements of urban life visitors come to Glacier to escape. In several scenic areas, the demand for parking facilities is well above capacity. Glacier cannot simply construct more roads and parking areas in environmentally sensitive areas to meet visitation demands. As a result, the 1999 Glacier National Park General Management Plan (GMP) emphasized the need for alternative transportation and visitor use planning.

To many visitors, driving the Going-to-the-Sun Road (GTSR) is the premier experience at Glacier National Park. The GTSR carries a number of special designations, including a National Historical Landmark, a National Register of Historic Places listing and a Historic Civil Engineering Landmark. Currently 80% of 2 million annual GNP visitors travel the road. The GMP also determined that the Going-to-the-Sun Road (GTSR) will need major rehabilitation due to major structural deterioration from high traffic volumes, harsh weather conditions, and inadequate maintenance. Therefore, federal legislation was passed to reallocate $1 million in FHWA funds to conduct an Engineering Study, Socioeconomic Study, and assemble a Citizen's Advisory Committee. In addition, a Transportation Study, Cultural Landscape Inventory, Business Survey, and Visitor Use Study were completed. All these studies supported establishing a shuttle system in Glacier Park, specifically as a mitigation measure for facilitating visitor access along GTSR and to encourage alternative transportation during the GTSR rehabilitation scheduled to begin in 2006. Transit was identified as a mitigation measure due to the anticipation of limited parking in the alpine trailhead areas being identified as construction staging areas. Transit will allow better access to alpine trailheads with greatly reduced parking. The preferred alternative was the most supportive of transit calling for 30-minute headways. The Park's 1990 Transportation Plan also supported the implementation of shuttle services regardless of rehabilitation of the road, supporting the continued use of these shuttle buses after rehabilitation is complete.

Despite all these identified transportation planning needs, Glacier did not have personnel on staff with transportation planning/engineering skills to fulfill the mitigation requirements outlined in the GTSR Environmental Impact Statement (EIS). The Scholar Program has been valuable to the Park, bringing this specialized skill set into park projects. The park has been fortunate to host several Transportation Scholars from the program's inception. During this time, the combined efforts of the three scholars provided the park with transportation

expertise that has been crucial for planning the shuttle systems and Intelligent Transportation Systems (ITS) associated with the rehabilitation of Going-to-the-Sun Road (GTSR).

I was Glacier's second Transportation Scholar - June 2002 to September 2004. My first term was for one year, then an extension was granted for 6 months, whereby I decided to work part time for one year. During my 2 year tenure as transportation scholar, I either led or assisted in the development of the following projects:

- Shared Red Bike Program
- GTSR Traffic and Parking Study
- Hiker's Shuttle Operational Improvements
- Climate Friendly Parks Initiative
- Employee Shuttle Startup
- Many other transportation-focused activities

In addition, I was the Park Lead on the following studies:

- Glacier Park Alternative Fuels Study
- GTSR Intelligent Transportation Systems (ITS) Architecture
- Transit Implementation Plan
- Intelligent Transportation Systems (ITS) Deployment Plan

This Final Report documents these projects. For the several projects whereby I managed consultants completing the study, I will provide an executive summary of the work completed. Appendix A highlights media coverage I received as a transportation scholar.

Chapter 1: Going-to-the-Sun Road Traffic and Parking Study

Counters Installed on Going-to-the-Sun Road @ Avalanche

Introduction

During the 2002 season, Glacier National Park collected a variety of transportation-related data to establish baseline conditions and to be able to offer recommendations on alleviating traffic and parking congestion in the park. Traffic data was collected at several locations along Going-to-the-Sun Road utilizing portable pneumatic traffic tube counters. In addition, parking occupancy, turnover, and flagging data was collected at Logan Pass Visitor's Center. This report presents the results of those data collection efforts, and in combining the results of previous data collection through entrance counts and the 2000/2002 Visitor Use Surveys, offers recommendations on how the park may better manage traffic and parking, especially with the anticipation of Going-to-the-Sun Road Rehabilitation.

Study Justification and Methodology

Traffic Circulation Study

The *Going-to-the-Sun Road Transportation and Visitor Use Study,* completed in August 2001, utilized traffic count data that was collected from a variety of different sources, then adjusted to estimate 2000 summer traffic volumes. As a result, the counts could only be used as a general guide for existing traffic conditions. Additionally, although the study did estimate these volumes, they did not provide good information on internal circulation through the park. This information is crucial in the planning of the Going-to-the-Sun road re-habilitation to minimize visitor impact. Anne Dunning, Glacier's first Transportation Scholar, started a data collection effort in the 2001 season through requisition of enough traffic counters to collect continuous traffic data. Due to the late requisition of a full set of traffic counters, she was not able to collect all the data needed to complete a traffic study. Specifically, Anne Dunning specified the following as the key reasons for obtaining more accurate counts along segments of Going-to-the-Sun Road:

- Understanding the number of vehicles and visitors who use the road and who will be affected by road rehabilitation delays and inconveniences,
- Projecting socioeconomic impact to the surrounding region based on visitors deterred from coming to the park for lack of scenic drives
- Estimating demand for a transit shuttle system intended to maintain visitation while reducing the number of vehicles on the road during rehabilitation
- Scheduling construction based on time of day projections of road demand for each segment of the road
- Staging visitors in road sections with relatively low demand while rehabilitation occurs on other sections of the road

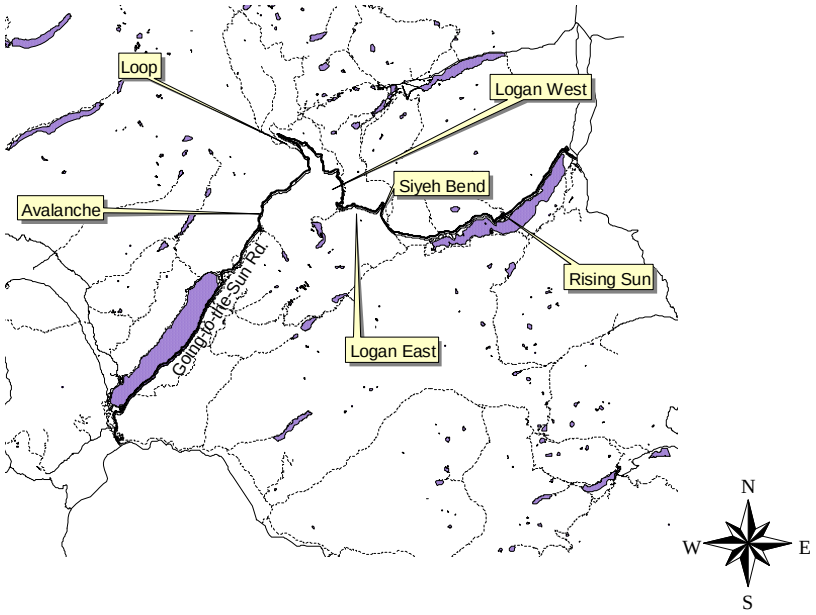
Anticipating the need to collect this data, eight (8) pneumatic tube traffic counters were procured by Glacier Park to collect traffic data. The pneumatic traffic counters were installed in the following locations from west to east along Going-to-the-Sun Road, as shown in the following table:

Traffic Count Locations from West to East

	Traffic Count Locations
1	Avalanche
2	The Loop
3	Logan West
4	Logan East
5	Siyeh Bend
6	Rising Sun

These locations are mapped in the map below. The remaining two counters were utilized as “floaters” to replace individual counters that need to be recharged, or for count studies on other roads in the park that have not been monitored in the past, such at Cut Bank.

Traffic Count Location Map



In 2001, few traffic counters were available so they had to be rotated to different locations for two weeks of data collection. Since additional counters have been procured after the 2001 season, we were able to leave these counters in these locations for the entire 2002 season, giving more accurate shoulder season as well as weekend vs. weekday data.

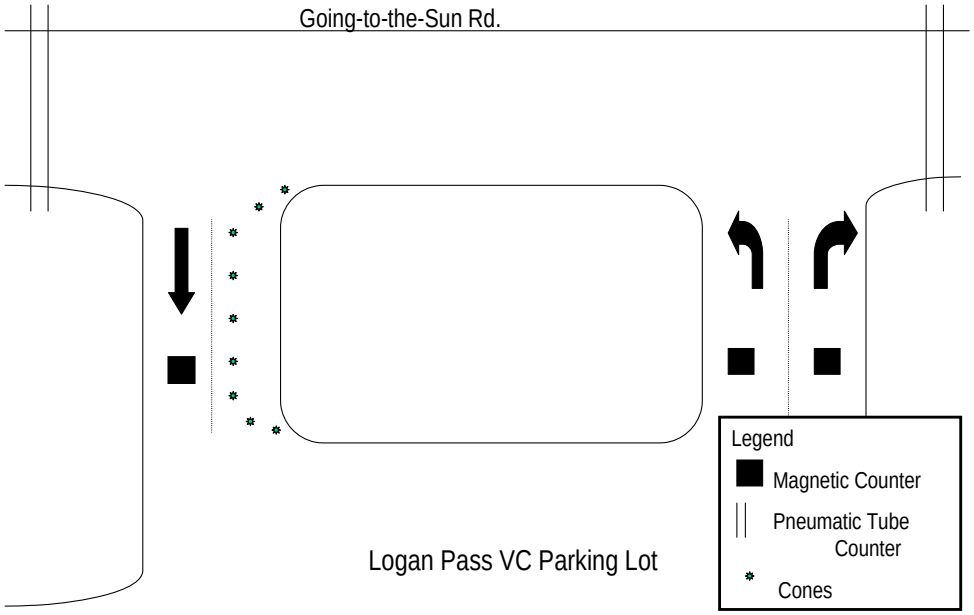
In addition, two loop detectors were procured to collect data at park entrances that have not had working counters for two years. These new loop detectors were installed at Two Medicine and Many Glacier, and collected traffic data in those areas of the park. These statistics were utilized in Glacier’s Public Use Report for more accurate visitor use reporting. In January 2002 Glacier National Park embarked on a new way of compiling visitation figures that is consistent with the nationally accepted method used in other parks. This was a change from the previous system designed many years ago. The newly developed system streamlines data collection and provides monthly totals on park visitation statistics. The park collects raw data and now inputs the information into an internet-accessible database that promptly calculates the monthly public use reports. The traffic data collected at Two Medicine and Many Glacier has been incorporated into this new methodology to calculate visitor use statistics.

With reliable count information at all park entrances as well as counts along segments of the Going-to-the-Sun Road, we will be able to get a complete picture of park traffic and address the objectives Anne Dunning laid out. This data collection effort augmented the work she has done, and provides more detailed, road segment-level traffic data, with coordinated, simultaneous data available from having multiple counters on the road at the same time.

Parking Occupancy and Turnover Study

Logan Pass Visitor's Center is considered the most impacted parking lot in the park. However, we have very little data about exactly when it fills up, how often it fills up, and what the occupancy is at different times of day. Additionally, we have no observed data on how long on average a vehicle is parked in the lot. Currently, when the lot fills, Visitor Use Assistants put up "Lot full" signs and flag cars past the lot until enough parking spaces free up to allow more vehicles in. Visitors frequently "cruise" for parking, and send passengers out to "save" a parking space if one can be found. This kind of parking experience frustrates visitors and can degrade the overall Glacier Park experience. However, these are all second-hand stories about the parking situation at Logan VC. The *Transportation and Visitor Use Study* stated that demand exceeds capacity from about 11am to 4pm on most good weather days, but does not have specific data on the times the lot fills. In the 2002 season, specific information about parking patterns was gathered at the Logan VC with the goal of better managing parking in our most congested parking lot. A four-pronged approach was taken to data collection:

1. ***Count vehicles entering and exiting the lot.*** FHWA generously loaned us magnetic counters that can count cars by lane, and classify vehicles by length and speed. We installed one of these counters at the one-lane entrance of the Logan VC, and two at the exit so we can determine how many vehicles are heading east vs. west when leaving the parking lot. Combined with the pneumatic tube counters installed east and west of the parking lot, we will be able to determine current demand.



Logan VC Parking Counter Locations

2. ***Have Visitor Use Assistants (VUAs) record exactly when they started and stopped flagging vehicles past the VC.*** The vehicle counts entering the lot will not accurately gauge demand because of the visitors that want to enter the lot when it is full, but are flagged by. Therefore, VUAs have been instructed to record the times they started and stopped flagging plus the number of cars that were flagged by. This will allow us to determine unconstrained demand, as well as determine the patterns of when the lot fills.

3. ***Conduct a parking turnover study.*** The visitor use survey asked a question about the stay at the Logan VC, but this data has never been collected. By recording license plates, and monitoring the turnover every half hour, we were able to determine an accurate snapshot of the average vehicle stay and how many vehicles utilize a space in a single day.

4. ***Conduct a parking occupancy study.*** Another key piece of data that had never been collected was parking occupancy. What percentage of the lot is typically full at 8am, 10am, noon? What time does the parking lot start to empty out in the afternoon? What percentage of the vehicles stay in the parking lot overnight? This data was collected in tandem with the parking turnover data. This information is important to confirm the current practice of telling people that the lot is generally full from 11am to 4pm. We may find that the hours the lot

is full are actually less than what we tell visitors, or perhaps even longer than 11am to 4pm.

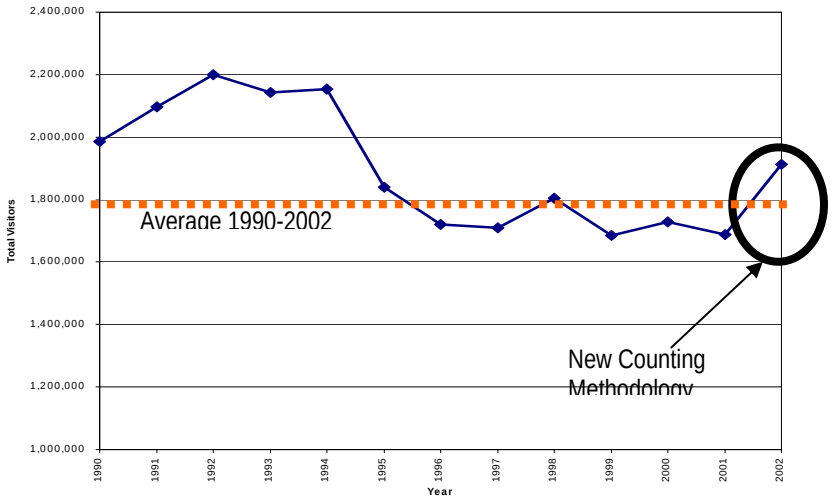
Installed Magnetic Counter at Logan Pass Parking Lot Entrance

This combination of parking data collection gave us a good snapshot of use patterns in the Logan Visitor VC. The parking occupancy and turnover data was collected on Wednesday, August 21, 2002, from 9am to 4:30pm. The weather was sunny and clear, and bit windy. The magnetic counters at the entrances were installed on July 12 and collecting data for most of the season. The hope is that recommendations from this data will result in better management of the parking lot both during the rehabilitation as well as long-range parking management.

Study Results

2002 traffic and parking count data, as well as previous data collection efforts undertaken by Anne Dunning and during the *GTSR Transportation and Visitor Use Study*, were combined to provide data to produce general visitation trends.

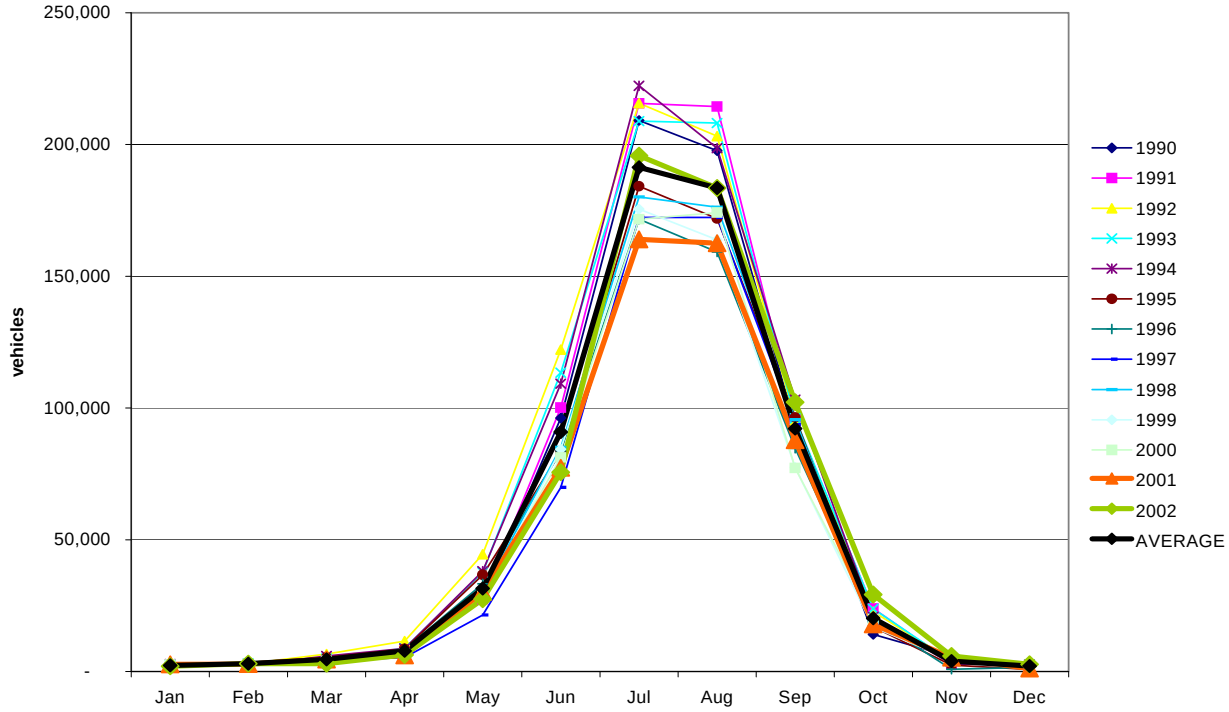
Total Visitation Trend 1990-2002



General Visitation Trends

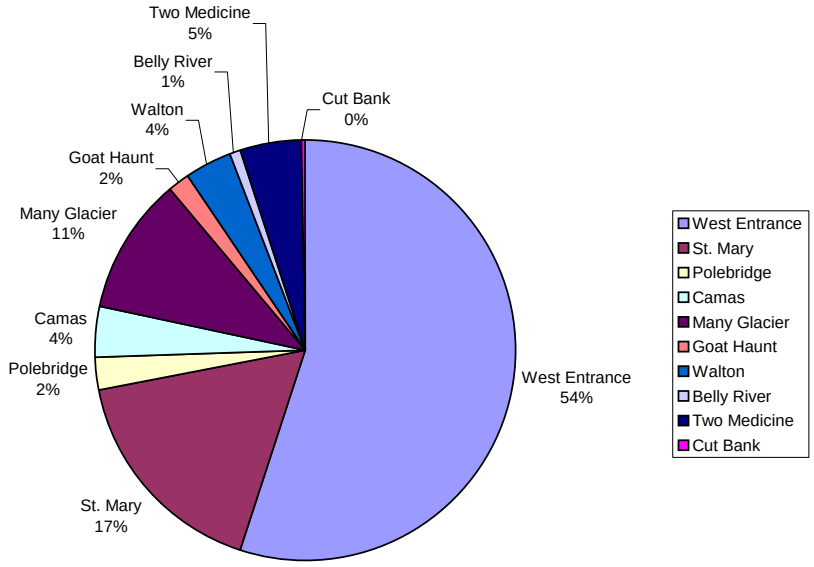
- Total Visitation for 2002: *1,911,333*
- General downward trend in the 90's
- New counting methodology implemented in 2002 for more accurate statistics, 13% rise from 2001 to 2002, but much of the increase can be attributed to new reporting methodology opposed to actual increased visitation
- 2002 visitation close to the 12 year average of 1,897,357

Multi-year Comparison of Monthly Park Visitor Vehicle Entrances



- Consistency in shape of curve over 12 year period shows that the seasonal peaking in July and August is predictable, with no indication that visitation is spreading out into the shoulder seasons.
- The month of July has historically been the peak month, with August statistics matching those of July's or slightly below. The spring shoulder season tends to have higher visitation than the fall shoulder.
- July & August visitation comprises approximately 56% of the total year's visitation
- June and September has similar average visitation, but June has more variation from year-to-year than in September, likely due to spring weather conditions effecting Going-to-the-Sun Road opening dates.

2002 Total Visitors by Entrance

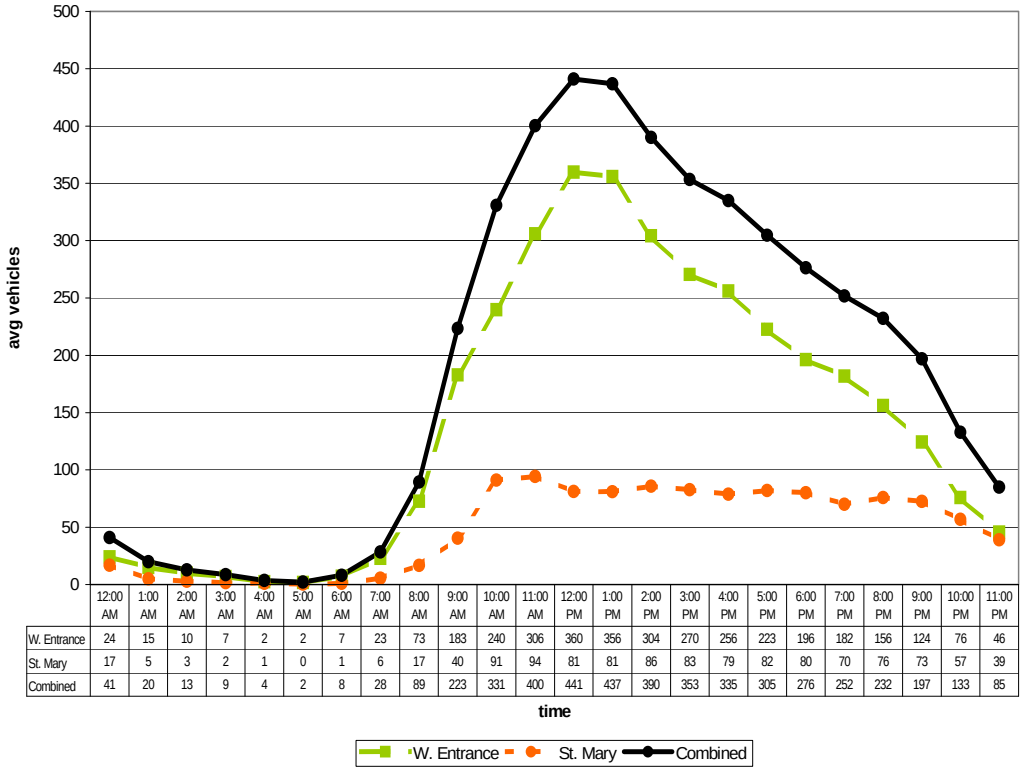


- 54% of visitation comes in at the West Entrance.
- Adding St. Mary entrances, 72% of visitation comes from West Entrance and St. Mary combined.
- 65% of visitation comes in the West side, opposed to 35% on the East side.

Visitors Entering the Road via West Entrance and St. Mary
By Time of Day - August 2002 Averages

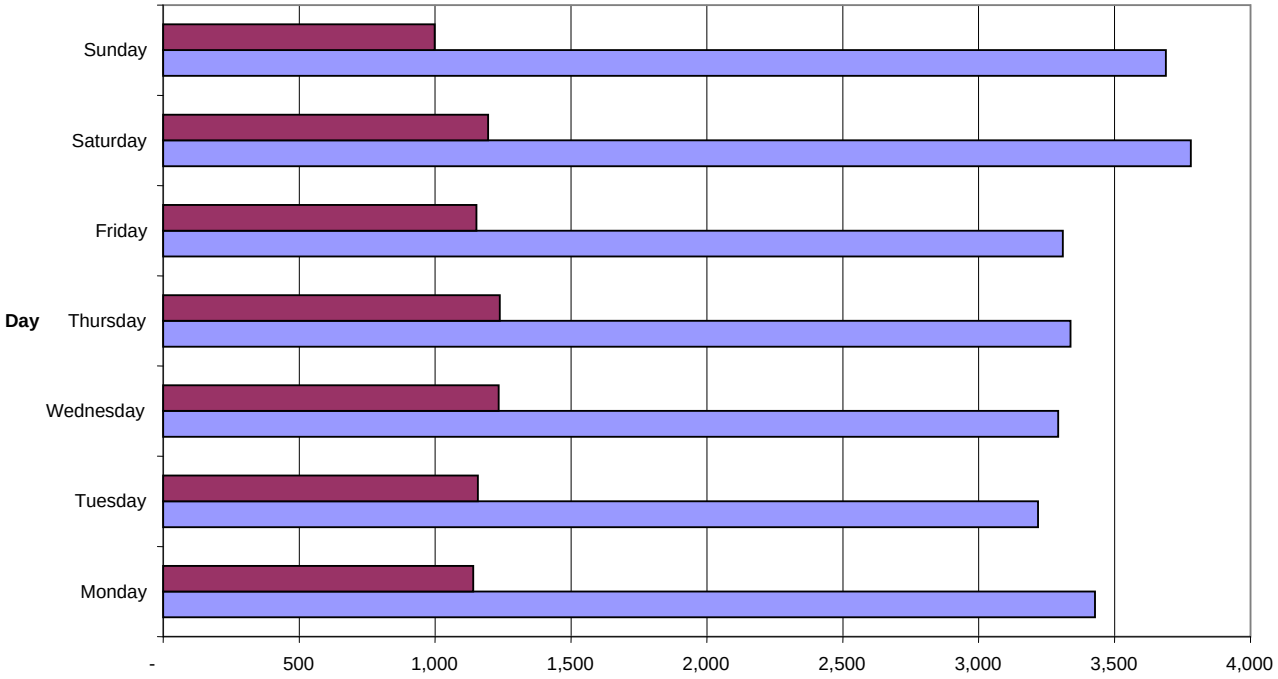
Time of Day Trends

- Combined traffic peaks between noon and 1pm with 441 vehicles entering during that peak hour. West Entrance peaks during the same time period, with 360 vehicles entering between noon and 1pm (6 entries per minute). St. Mary peaks an hour earlier, between 11am and noon, with 94 vehicles (1.6 entries per minute).
- The West Entrance has more of a peak period while St. Mary has steady visitation throughout the day. Although visitation peaks around noon to 1pm, visitation remains quite high until about 9pm. Notice that we have about the same numbers of vehicles coming in from 9am-10am (223 vehicles) as 8pm-9pm (232 vehicles). 84% of visitation occurs between 9am and 8pm, 53% between 10am and 4pm.
- Entrance stations should be staffed to handle these peaks as well as ensuring that they are open long enough hours to maximize revenue.



	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM
W. Entrance	24	15	10	7	2	2	7	23	73	183	240	306	360	356	304	270	256	223	196	182	156	124	76	46
St. Mary	17	5	3	2	1	0	1	6	17	40	91	94	81	81	86	83	79	82	80	70	76	73	57	39
Combined	41	20	13	9	4	2	8	28	89	223	331	400	441	437	390	353	335	305	276	252	232	197	133	85

Entries per Day of Week – Weekday vs. Weekend Activity

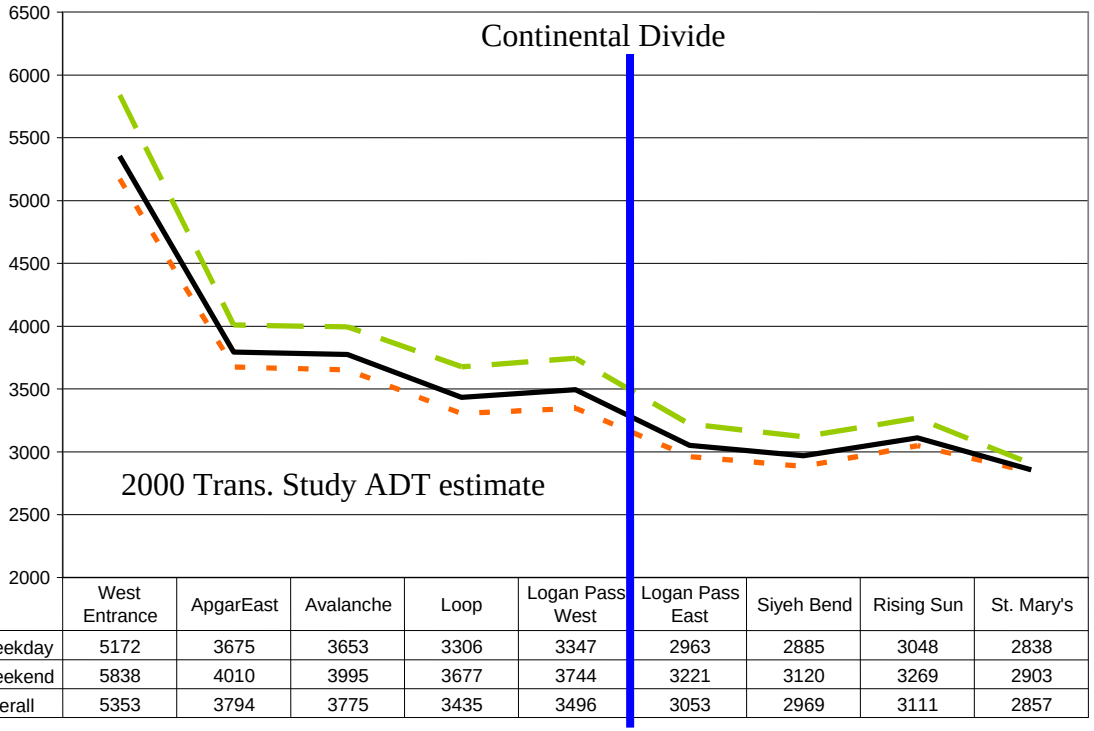


	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
St. Mary	1,141	1,158	1,234	1,239	1,153	1,196	999
West Ent	3,428	3,219	3,293	3,338	3,310	3,781	3,689

- The East side and West side show different patterns in terms of weekend vs. weekday visitation.
- East side generally does not have weekend peaking, with Wednesday and Thursday being the peak days.
- West side does show a pronounced increase in traffic on the weekends.

Average Daily Traffic – 2002 Season

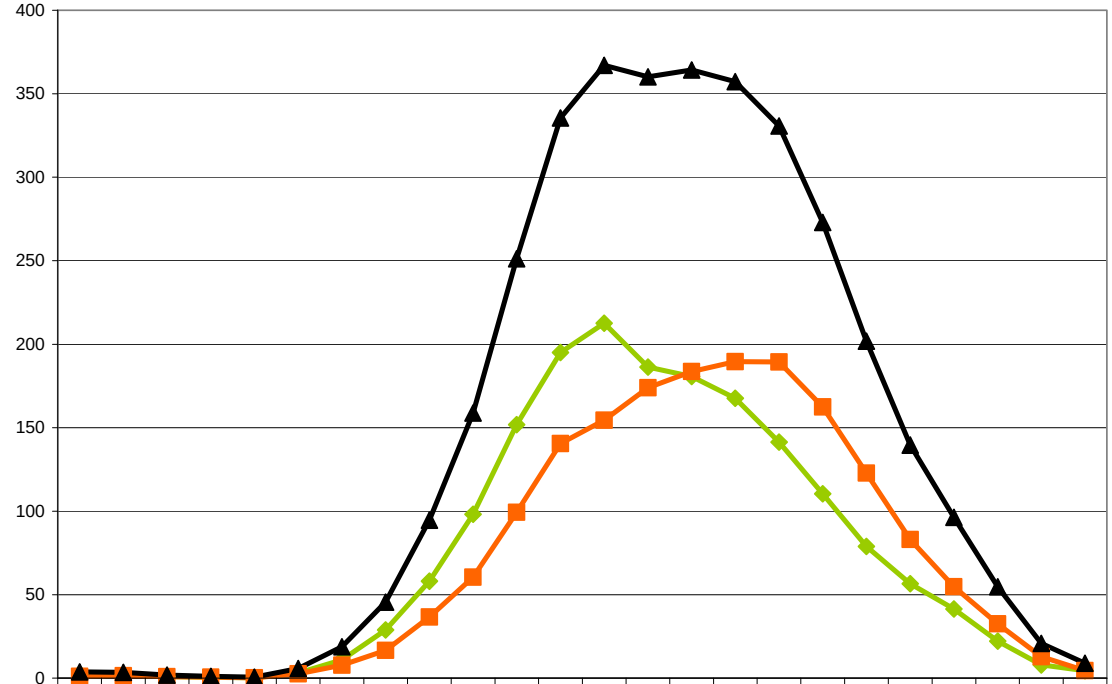
- A small spike at Logan Pass West suggests that visitors may be roaming around for parking in Logan Pass area.
- Higher visitation on weekends vs. weekdays, with a greater difference between weekend and weekday use on West Side than on the East Side, suggesting that increased weekend traffic has more impacts on West side than East side. However, Logan Pass does have higher traffic volumes on the weekends.
- The West entrance shows considerably higher traffic than the rest of the GTSR due to traffic going to into Apgar Village and onto the Camas Road. Traffic volumes go down as you go from west to east along Going-to-the-Sun Road.
- A comparison between the recent data collected and the traffic volume estimates utilized in the *Going-to-the-Sun Road Transportation and Visitor Use Study* (represented by the triangle above) indicate that the study underestimated traffic volumes by approximately 20% at Logan Pass.



	West Entrance	ApgarEast	Avalanche	Loop	Logan Pass West	Logan Pass East	Siyeh Bend	Rising Sun	St. Mary's
Weekday	5172	3675	3653	3306	3347	2963	2885	3048	2838
Weekend	5838	4010	3995	3677	3744	3221	3120	3269	2903
Overall	5353	3794	3775	3435	3496	3053	2969	3111	2857

Logan Pass Hourly Traffic

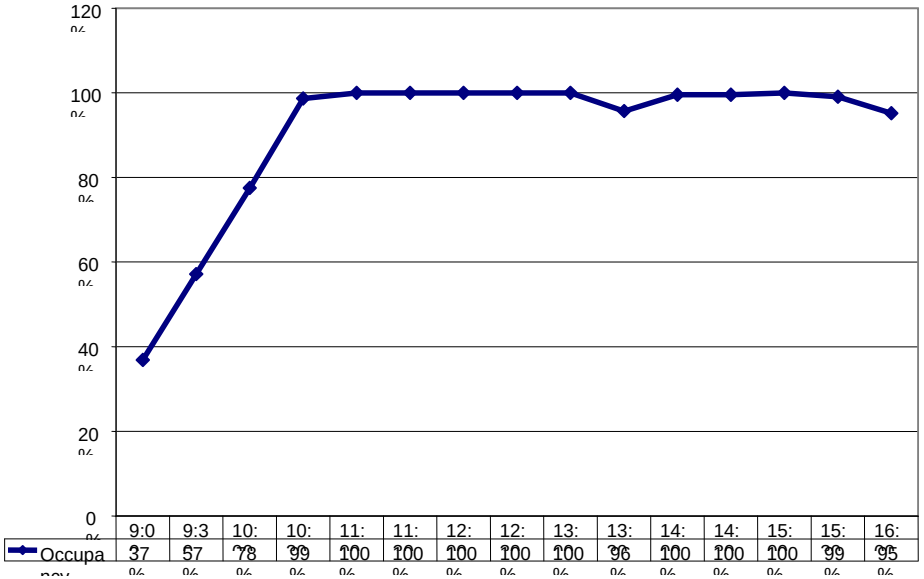
- Traffic on Going-to-the-Sun Road just west of Logan Pass peaks between noon and 4pm.
- During the peak period, volumes of approximately 365 vehicles per hour, or 6 vehicles per minute, or 1 vehicle every 10 seconds, were recorded.
- There is more traffic going in the eastbound direction until 2pm, then traffic going Westbound surpasses the eastbound traffic. This pattern makes sense given that a majority of those going to Logan Pass are coming from the West side of the park.
- The smooth curve representing total traffic suggests that there isn't a time where traffic suddenly drops off, traffic gradually increases until noon, peaks for four hours, then gradually decreases.



	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
Eastbound	3	2	1	1	0	3	11	29	58	98	152	195	213	186	181	168	141	110	79	57	41	22	8	4
Westbound	1	2	1	1	0	3	8	17	37	61	99	141	155	174	184	190	189	163	123	83	55	33	13	5
Total	4	4	2	1	1	6	19	46	95	159	251	336	367	360	364	357	331	273	202	140	96	55	21	9

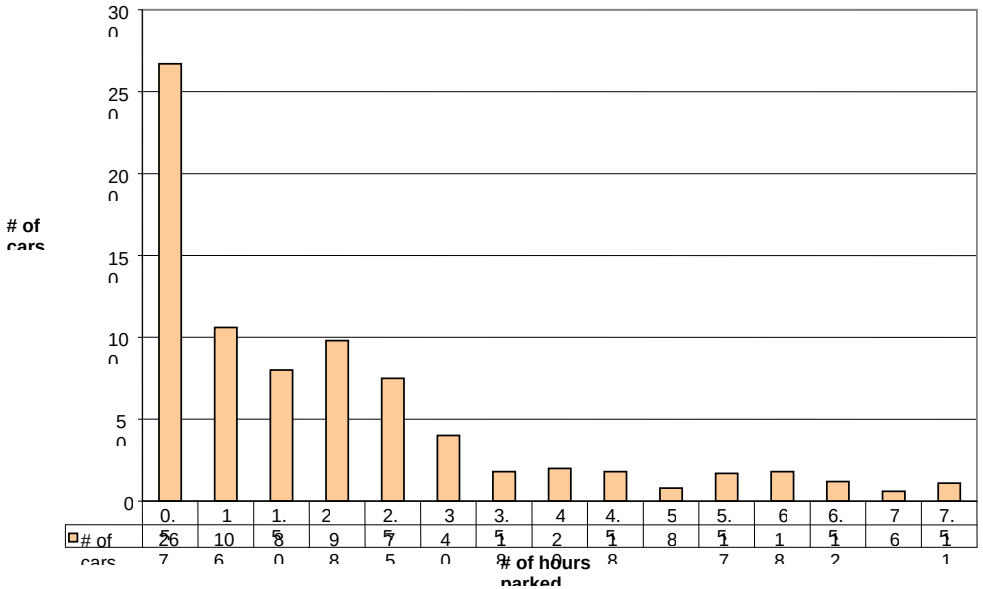
Logan Pass Parking Statistics

Logan Pass Parking Percentage Occupancy



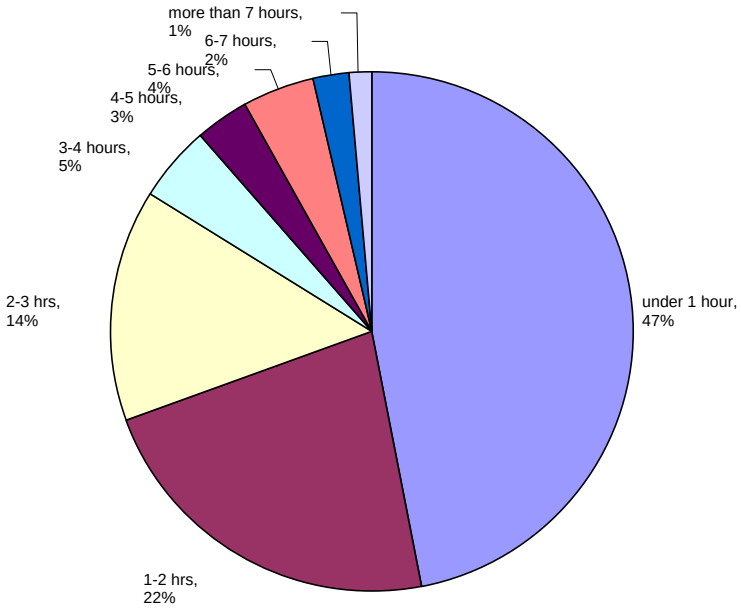
- Logan Pass Parking Lot was 100% full from about 10:30am to about 3:30pm. During this period, the lot had multiple vehicles searching for parking, so demand was greater than supply, resulting in a true occupancy rate of over 100%.
- At 1:30 pm, there was a small dip in occupancy from 100% to 96%. Since only a single day of parking data was collected, this may be an unusual occurrence.
- Starting around 4pm, spaces started to free up.

Logan Pass Parking Duration



- The average parking duration of all the vehicles was 2 hours.
- The rate of turnover was 3.3 vehicles per space per day. Therefore, if a single space could be freed up, it would accommodate 3.3 vehicles per day.
- 794 cars parked in the parking lot during the study period.
- Only 11 of the vehicles were already parked in the lot for the entire duration of the study. This suggests that not allowing overnight parking won't make a significant difference in parking availability.

Logan Pass Parking Duration Percentages



- 47% of the vehicles were parked for less than an hour. (34% under ½ hour, 13% under an hour), suggesting that there is high turnover at Logan Pass. Adding some of these percentages together, 84% of the vehicles are there for less than 3 hours.

- **Flagging data** – VUAs recorded 36 separate flagging incidences between July 19th and August18th. Saturdays and Mondays had the highest # of incidents. The most impacted times were between 12:30 and 1pm, and the average time the VUAs had to flag vehicles was 26 minutes. The earliest incident started at 11am, and the latest went until 2:30pm.
- **Traffic data** – During the peak periods, the traffic volume entering Logan Pass parking lot averages about 200 vehicles/hr. This volume seems quite high considering that the parking lot has 238 spaces available. This may explain the 2002 Visitor Use Survey question about Logan Pass visitation - that 14% of visitors wanted to stop at Logan Pass, but could not because of parking unavailability.

Logan Pass Parking Management Recommendations

From the data collected, several short and longer-term recommendations may help alleviate parking congestion in the parking lot. With the average turnover rate at 3.3 vehicles per space per day, every single space that can be freed up will help alleviate congestion. There are several different strategies to free up spaces:

- **Underutilized parking spaces**: Potential spaces that are currently underutilized include some of the tour bus parking, which remained mostly open throughout the day, handicapped parking, where most of the vehicles that parked there were parking illegally. If the spaces currently utilized for buses could be moved to the curb of the loading area, quite a few regular parking spaces could fit into the current bus spaces.
- **Freeing up parking through encouraging carpooling**: If every single ranger, visitor use assistant, contractor, and GNHA employee takes their own vehicle up to Logan Pass, they could potentially take up 10% of the spaces. By doing a little organizing and asking employees to carpool, it may make a major impact on available spaces.
- **Designate time limit parking**: 34% of the people visiting Logan Pass stay for less than a half hour. By designating a portion of the lot ½ hour or 15 minute parking, it may further encourage shorter stays, increasing the turnover rate. However, this may be difficult to enforce. Designating time limit parking in the front of the lot will also help with the pattern of people staying all day parking closest to the VC, so that the parking spaces with the most turnover tend to be further away. Those staying for short periods should be able to park closer.
- **Discourage activities that keep visitors at Logan Pass longer than necessary**: Activities such as picnicking, naturalist-led walks, and extended interpretive activities should not be encouraged at Logan Pass. Even the presence of the bookstore keeps people at Logan Pass longer.
- **Encourage transit usage**: In the short term, encourage use of the improved hiker's shuttle. In the longer term, support a more convenient and affordable shuttle system that has the ability to free up parking spaces.

2002 Visitor Use Survey Key Results

In 2000, a Visitor Use Survey was administered to help provide data for the design of the Going-to-the-Sun Road rehabilitation alternatives. A similar survey was done in 2002, this time with the purpose of asking visitors questions that pertained to the alternatives presented in the Draft Environmental Impact Statement (DEIS). These two surveys focused on demographic, trip and expenditure characteristics, mode and travel choices relative to potential road restrictions due to rehabilitation improvements, and the sequencing and time spent at various Park sites. Coley/Forrest completed the survey analysis. This section summarizes key results from the 2002 survey and Coley/Forrest's analysis that relate to traffic and parking conditions.

Visitor Characteristics

The 2002 Visitor Use Survey provided composite visitor characteristics. The average Park visitor:

- Has visited the Park 7.7 times before and intends to return to the Park,
- Is traveling in a car with family members,
- Is traveling with an average party size of 3.47 (we have been using 2.9 as our multiplier), and
- Is in a travel party which spends $218 per day.

Questions regarding Logan Pass Restrictions

A series of questions about Logan Pass visitation and possible restriction scenarios during rehabilitation may help us predict the impacts of rehabilitation on park visitation.

Did you stop at the Logan Pass area during your visit? (Q28)

RESPONSE	% RESPONDING
Yes	77%
No	9%
Wanted to, but no parking	14%
Total	100%

Although over 90% of visitors wanted to stop at Logan Pass, only 77% actually did because of parking congestion. This figure supports the observation of high occupancy in the Logan Pass parking data collection.

The 2000 survey asked visitors where they did NOT visit. The results are as follows:

What areas did you NOT visit? (Q18, 2000 survey)

Logan Pass	**15%**
Apgar Village	47%
Avalanche	51%
Jackson Glacier Overlook	55%
Many Glacier/Swiftcurrent	56%
St. Mary VC	56%
Rising Sun	60%
Sunrift Gorge	61%
Sun Point	65%
Siyeh Bend	70%
Two Medicine Area	80%
Chief Mtn Area	85%

The percentage of visitors not visiting Logan Pass re-iterates Question 28. Logan Pass is, by far, the most popular destination in the Park.

If you had known in advance of your trip that, because of road congestion, Logan Pass could only be accessed from one side of the Park, would you still come to GNP and travel along Going-to-the-Sun Road to Logan Pass, still come to GNP, but not travel along Going-to-the-Sun Road, not come to GNP, or don't know? (Q16)

RESPONSE	**% RESPONDING**
Still come to GNP, and travel GTSR	58%
Still come to GNP, not travel GTSR	11%
Not come to GNP	14%
Don't Know	17%
Total	100%

From this question, the worst-case visitor decrease from GTSR rehab would be 31%, adding the 14% who would not come to the 17% who were not sure. However, assuming that half of those who answered, 'don't know,' decide to come anyway, a more accurate prediction would be a 22% (14%+8%) decrease. The next question was asked as a follow-up question to Q.16 to those who answered that they would not come or were uncertain whether they would come.

If you knew in advance that the Park Service was going to increase the number of exhibits and visitor use opportunities in GNP to offset access to Logan Pass from only one side during construction, would you still come to GNP and travel along Going-to-the-Sun Road to Logan Pass, still come to GNP, but not travel along Going-to-the-Sun Road, not come to GNP, or don't know? (Q16a)

RESPONSE	% RESPONDING
Still come to GNP, and travel GTSR	19%
Still come to GNP, not travel GTSR	13%
Not come to GNP	31%
Don't Know	37%
Total	100%

This question gauges the effectiveness of mitigation through increased interpretive exhibits and visitor use opportunities. A total of 32% (19%+13%) of those who previously said that they would not come or were uncertain (question 16) would come with increased interpretive opportunities. Again, assuming that half of those that are uncertain decide to come, then 50% (32%+18%) could be convinced to come. Combining this figure with the results from question 16, knowing about Logan pass restrictions and offering interpretive mitigations would reduce the 22% prediction in half, down to 11%. Therefore, the visitor reduction due to road restrictions would be down 22% if no alternatives are provided, however, if mitigating exhibits and visitor use opportunities are provided, the visitor reduction would like decrease by 11%.

A similar question was asked in Q17. Instead of 'access from one side of the park,' the limiting factor was 'up to a 1-hour delay.' The survey results of closing access from one side of the park (Q16) were very similar to a 1-hour delay (Q17). However, when the same question was asked about increased exhibits and visitor use opportunities (Q17a), more respondents faced with a 1-hour delay were agreeable to these mitigations with 45% coming anyway, opposed to only 32% (Q16a) that would come anyway if the road were closed on one side. This suggests that a 1-hour delay is more 'mitiagatable' than closing one side of the pass.

If road construction or road congestion limited traffic… would you prefer to… (Q31)

RESPONSE	% RESPONDING
Pay a fee and drive	27%
Take a free tour bus	43%
Not visit the road but visit the park	10%
Not visit the park	11%
Other	2%
Don't' know	8%
Total	100%

This question gauges how visitors would react to access choices to Logan Pass during construction. Given the choice between paying a fee to drive to Logan Pass and taking a free tour bus, the free tour bus was the more popular choice with 43%, while 27% indicated that they would prefer to pay a fee and drive the Going-to-the-Sun Road themselves. The percentage of visitors that would likely not come at all given these choices would be 15% (11% plus one-half of 8%).

If shuttle service along Going-to-the-Sun Road were expanded to offset traffic delays caused by road construction, under what conditions would you use the expanded shuttle service? (Q19)

RESPONSE	**% RESPONDING**
Would not use shuttle service	24%
Yes, if frequency is at least every 2.5 to 3 hours	5%
Yes, if frequency is at least every hour	33%
Yes, if frequency is at least every half hour	23%
Don't' know	15%
Total	100%

Shuttle service would be an agreeable alternative to 61% of the respondents, while 24% would not use the service no matter how frequent it is, and 15% are uncertain. Splitting the 'uncertains' evenly, about a third would not take a shuttle while two-thirds would hop on a shuttle. Adequate frequency is key to the success of the shuttle system. Only 5% would take the shuttle if headways were more than 2.5 hours, 38 % if headways are at least an hour, and 61% if headways are at least every half hour. This suggests that the EIS recommendation for half hour rather than hourly frequencies for transit will increase ridership 23%.

Analysis and Recommendations based on Visitor Statistics and Traffic Data

This section reviews the key objectives of this data collection effort and presents the findings based on past and current data. By combining traffic count data with analysis from the 2002 visitor use survey, we can gain a better understanding on the potential impacts of road rehabilitation on visitation. Going back to the primary objectives of the data collection presented earlier:

Understanding the number of vehicles and visitors who use the road and who will be affected by road rehabilitation delays and inconveniences – The Going-to-the-Sun Road Transportation and Visitor Use Study underestimated the Average Daily Traffic (ADT) at Logan Pass by approximately 20%. The estimate, based on 1997 counts, was about 2,900, whereas the actual ADT in 2002 was about 3,500. Since ADT is bi-directional, if we take half of the 2002 ADT at Logan Pass, closures would affect approximately **1,750 vehicles per day**. Utilizing the 2002 survey's average party size of 3.47 persons per vehicle, this would translate to a total of **approximately 6,100 persons per day** that would be affected by road delays. Traffic counts at Logan Pass, opposed to other areas, are utilized because it is the most visited site in the park.

Projecting socioeconomic impact to the surrounding region based on visitors deterred from coming to the park for lack of scenic drives – If the road is closed from one side or if there is a 1-hour delay, a 22% decrease in visitation is expected (Q16/17). Therefore, visitation would decrease 700, from about 6,100 persons per day to **5,400 persons per day**. With the travel party spending the average figure of $218 per day, and dividing that figure by the average party size of 3.47, the average amount spent per person per day is approximately $63. Multiplying the decrease of 700 persons by $63, the economic loss would be **$44,100 per day**. Over a single season, for the months of July and August, the impact would add up to approximately **$3 million**. However, with the mitigating factors of increased exhibits and visitor use opportunities involved in the case of a road closure, the 2002 survey predicted that the impact would be half, 11%, resulting in 350 persons per day, **$22,050 per day**, and **$1.5 million per season**. With a one hour delay, the impacts would not be as pronounced comparatively, since a one-hour delay is more 'mitigatable' than a road closure.

Estimating demand for a transit shuttle system intended to maintain visitation while reducing the number of vehicles on the road during rehabilitation – A total of 61% of survey respondents indicated that they would take a shuttle if the frequency were at least every 30 minutes. Since the Going-to-the-Sun Road Rehabilitation Environmental Impact Statement (EIS) recommended 30 minute frequencies, this will be the assumption in estimating transit demand. With 6,100 persons per day visiting Logan Pass, the demand for a transit shuttle system up to Logan Pass would be about **3,700 transit riders per day.** The current capacity on the 14 buses

planned for rehabilitation would only be about 20 riders per bus. Unfortunately, with half hour service running from 7am to 11pm, with each bus full to capacity for the entire day, the shuttle could only carry about **1,300 trips per day**. In addition, since most people would be taking the shuttle in both directions, the actually number of riders per day that the current system could carry would be **650 transit riders per day**. *Therefore, the current system, as planned, would be able to carry only 19% of the estimated demand*. Utilizing the 650 potential transit riders per day and the average party size of 3.47, the shuttle system has the potential to take off the road **187 vehicles per day,** which is about 11% of total traffic.

Scheduling construction based on time of day projections of road demand for each segment of the road – Before the traffic counts were collected, the only hourly data available was from the entrance stations. Traffic patterns at the entrance stations are different from those in the alpine areas. The combined entrance station traffic peaks between noon and 1pm. At Logan Pass, the peak starts at the same hour, but continues longer into the afternoon until 4pm. The smooth curve in Figure 11 representing Logan Pass total traffic suggests that there isn't a time where traffic suddenly drops off. Traffic gradually increases until noon, peaks for four hours, then gradually decreases. To minimize traffic impacts, construction in the alpine areas should be minimized during the peak periods, between noon and 4pm. During this time, flaggers can expect to see traffic queue up at 6 vehicles per minute. For construction scheduling in the shoulder seasons, the spring shoulder season in April/May/June has shown higher visitation than the fall shoulder season in September/October/November. Therefore, to minimize visitor impacts during rehabilitation, construction should be scheduled as far into the fall as possible.

Staging visitors in road sections with relatively low demand while rehabilitation occurs on other sections of the road – In general, traffic volumes are lower on the east side than the west side. Apgar Village and Avalanche has higher traffic volumes than the Loop or Logan Pass, but since the roads are wider in the lower elevations, traffic flows at higher speeds more smoothly. For construction scheduling on weekends vs. weekdays, there is generally more traffic on the weekends than the weekdays. However, this trend affects the west side more than the east side, where traffic is more consistent throughout the week. Therefore, scheduling construction on the weekends will have more of a negative impact on the west side than on the east side.

Chapter 2: Shared Red Bike Program

Background

The Glacier National Park Shared Red Bike Program provided a fleet of bikes for Glacier National Park employees to utilize for work or recreation trips. The program was funded from The Glacier Fund, the park's non-profit arm. A proposal was submitted to the Glacier Fund, competed against a variety of other park projects, and $9,000 was awarded to the project to purchase bikes, racks, helmets, and locks.

Project justification

Often destinations within Park Headquarters are perceived as too far to conveniently walk, so vehicles are utilized for short trips. When employees use cars for travel for short trips that could be completed by bike or walking, they pollute the air, use nonrenewable natural resources, avoid healthy exercise, and diminish the park's environmental stewardship goals.

This program gives employees an alternative to driving a vehicle when completing short trips, thereby preventing a cold start from an engine. Fuel consumption and pollution output are much higher in the first minute or two after a cold start than when the engine has achieved normal operating temperatures. Preventing cold starts has a greater impact to air quality than preventing longer-distance

Glacier's Red Bike

driving. In addition, this program will provide an alternative transportation icon to complement the red buses. A majority of the fleet will be the older-style cruiser bikes that will complement the red buses.

Some possible uses for the red bikes include:

- **Meetings**: Distances between buildings in the headquarters area are not very far, but many employees drive from building to building for meetings, or to the housing area for lunch. For example, an employee that works in Headquarters could check out a bike for a meeting at the Community Building or West Lakes Ranger Station. There are also opportunities at Apgar Village, Many Glacier, St. Mary, and Two Medicine for employee bicycle usage.

- **Campground monitoring**: Instead of using golf cart-type vehicles, bikes outfitted with baskets could be utilized to collect fees in campgrounds or monitor campgrounds to minimize the visual/noise impacts of a vehicle. The larger campgrounds, including St. Mary, Apgar, and Fish Creek, could benefit from bike patrol.
- **Recreational Use for Glacier Employees**: When the bikes are not being utilized for park business, they would be available for recreational use for employees. A checkout system has been developed to ensure bikes are secure and available for general employee use.

Red Bikes and Racks

Worksman Trading Corporation manufactured the bikes purchased for this program. They manufacture bikes for industrial uses, meaning that they are much more sturdy and long lasting than the bikes that you typically find in retail stores. These are the types of bikes that are typically used for rental fleets. Worksman provided the bikes for the University of Montana's Shared Bike Program, who has been very happy with the performance of these bikes. They also make tricycles that are typically used in warehouses, as well as tandem bikes. Quotes were also obtained from a local bike shop. The bikes that were quoted on are not as well-made as Worksman bikes, and the price of these bikes came out considerably more than Worksmans. ($230 local vs. $175 Worksman per bike). A combination of ladies and men's bikes were purchased to accommodate all employees, and included front baskets.

The rack style originally chosen were the serpentine 'wave' racks and upside down 'U' racks. However, these racks that are popular in urban settings would not fit well into the rural environment of Glacier Park. Therefore, more traditional racks were purchased and installed at Headquarters, the Science Center, Apgar Village Visitor Center, and the Library.

Bike racks installed

Bike Pod Locations

Location	# of bikes	Rack location
Headquarters	5	Back, near current rack
Science Center	3	By Ranger Station
Library	1	Outside Library entrance
Apgar Visitor's Center	2	Front of VC
Fish Creek Campground	1	Rack not needed
St. Mary Visitor's Center	1	Already has rack
Hudson Bay Ranger Station	2	Already has rack
St. Mary Campground	1	Rack not needed
Two Med Ranger Station	1	Outside of office door
Many Glacier Ranger Station	2	Outside of office door
Floaters dispatched as needed	1	
TOTAL RED BIKES	**20**	

Other Bikes for specific uses

In addition to the 20 red bikes, one “industrial tricycle” was purchased. The purpose of the tricycle is to allow for employees to haul lightweight items around the headquarters campus. The trike could be utilized for mail delivery and pick-up as well as service calls for Glacier’s IT staff.

Bike Type	#	Use	Location
Industrial Tricycle	1	Deliveries, mail, IT	Headquarters

Proposed “Worksman” Tricycle

Signage

Each bike was named after a peak in Glacier Park nearby where the bike is stationed; Nameplates modeled after the Glacier Fund’s Glacier National Park plate were produced to be able to easily track each bike.

Accessories: Locks, Helmets, & Lights

Cables and padlocks were purchased to secure the bikes. The padlocks were keyed to a single master. Keys were issued to employees through the current key system through the Park's Warehouse. Employees are required to wear a helmet as part of the program, and each bike location has loaner helmets available. Medium-sized front bike baskets were purchased to be installed on all bikes.

User Agreement Form

The user agreement form allows the park to track who has access to the bike, releases Glacier Park from liability, and informs the users about expectations for taking care of the bikes and helmet use. This user agreement form will need to be signed before a key will be issued.

User Agreement Form
Glacier National Park Shared Red Bike Program

User Name:_____
Local Residential Address:_____
Local Mailing Address:_____
Local Phone:_____
Email address:_____

The Red Bike Program aims to provide Glacier Park employees with an alternative to driving vehicles for short trips, thereby reducing emissions in the Park. Enjoy using the bikes, but please be respectful that they are for shared use. Glacier National Park agrees to provide use of bicycle, lock, and helmet and User agrees to the following:

1) **Condition**: Bicycle, lock and helmet must be returned in the same condition as when issued.
2) **Assumption of Risk**: User agrees that bicycle riding can be a dangerous activity and assumes the risk of bicycle riding to be their own liability.
3) **Helmet**: Helmet use is required in Glacier National Park. User acknowledges that a helmet is available to them as part of the program.
4) **Return of bike: Maximum loan time is 3 days**. Bicycle, lock, and helmet must be returned to it's original location within 72 hours of check-out. Bikes may be periodically "rounded up" for maintenance, whereby you will be contacted via email to return the bike. Failure to return bicycle, lock and helmet will subject user to legal liability of up to $300.

Release from Liability

By signing below, I hereby release Glacier National Park from any and all liability arising out of injury to myself, persons or property, and any loss, damages, or expenses arising out of my participation in the Red Bike Program.

Signature_____Date:_____

Maintenance and Storage

Since the program will utilize single speed bicycles, maintenance of the bikes is simple. Bikes will need a once-a-year tune-up, which could be done at the end of the season before going into storage. After the first summer of the program, volunteers were gathered for a bike tune-up "party." Volunteers were mostly employees who had utilized the program during the season. A small amount of remaining budget was placed into a maintenance account to purchase parts, maintain bikes, and provide funding for replacement bikes, if necessary. Bikes were stored in empty garages in the housing area during the off-season.

Red Bike Program Budget

Units	Description	Unit Cos	Total
20	Red Worksman Bikes	$175	$3,500
1	Industrial Tricycle	$615	$615
22	Front bike baskets	$10	$220
25	Helmets, Various Sizes	$30	$750
25	Master Locks and Keys	$20	$500
12	Bicycle headlights for shared use	$15	$240
1	Bike Rack for HQ	$600	$600
3	Remaining Bike Racks	$300	$900
Estimated Shipping for bikes/racks		-	$1,100
	Total Proposed Budget		**$8,425**

Future of Red Bikes at Glacier National Park

The Glacier Park Red Bike Program will hopefully expand to include a larger user-base in the future. Currently, only employees can utilize the bikes. In the future, with the construction of a new multi-modal transit center near Apgar Village, the program should be expanded to include visitors. Hopefully, other National Parks can utilize this program as a model to start up their own shared bike programs.

Red Bike Program Implementation Photos

Red Bikes Assembly – a Volunteer Effort

The Red Bike Debut – Polebridge 4Th of July Parade

Chapter 3: Transportation Studies

This chapter summarizes the four transportation studies I managed for Glacier Park utilizing A/E consultants:

- Glacier Park Alternative Fuels Study -HNTB
- GTSR Intelligent Transportation Systems (ITS) Architecture – Joe Kracum
- Transit Implementation Plan – David Evans Associates
- Intelligent Transportation Systems (ITS) Deployment Plan – SAIC

This chapter provides the Executive Summaries of each of these studies.

Glacier Park Alternative Fuels Study - HNTB

The National Park Service is working to deploy alternative transportation systems and alternative fuel vehicles in Park Service Units throughout the country. Deployment of these systems and equipment reduce vehicle traffic, congestion, and noise, improving the visitor experience. They also reduce the environmental impacts of vehicles in and around the Parks. This facilitates the Park Service's mission to promote the use and enjoyment of the Parks while preserving natural and historic resources for future generations.

Glacier National Park is faced with significant challenges related to both vehicle traffic congestion and air quality impairment. The popularity of the Going to the Sun Road and the resultant private automobile traffic causes major congestion on the Road and in the parking lots and turnarounds during peak season. It has also created a major road maintenance backlog that has forced the Park to plan a comprehensive renovation of the entire road for the near future. In addition to the dominant effect of wildfires, vehicle emissions also contribute to fine particulate matter in the atmosphere, which reduces visibility and interferes with scenic vistas at the Park.

Glacier has achieved significant success in deployment of alternative fuel vehicles and in June of 2003 realized completion of the conversion of nearly all of the Park's vehicles and other mobile equipment to alternative fuels. The planned deployment of a new alternative-fueled transit system within the Park will further reduce congestion in the future, particularly on the Going to the Sun Road. If this or a similar system capable of providing transit service between Glacier and the surrounding communities can be deployed in the future, even greater regional congestion mitigation and air quality benefits will result.

In its unique role as the principal steward of environmental resources in the region and in recognition of the effectiveness of a coordinated initiative, Glacier NP is promoting deployment of alternative fuels in

the areas surrounding the Park, through communication and outreach activities with parties potentially interested in using alternative fuels. Parties interested in actively participating in the initiative have been identified and canvassed, and a stakeholder's meeting has been held to facilitate communications. Several National Parks and their surrounding communities have achieved designation as Department of Energy "Clean Cities" Coalitions. Following on the designation of the Greater Yellowstone – Grand Teton Clean Cities Coalition in August of 2002, Glacier NP is now considering forming a coalition with surrounding communities to pursue Clean Cities designation.

The purpose of this project was to develop a program to support alternative transportation systems, including alternative fuel vehicles and fueling infrastructure, in Glacier National Park and its surrounding region. Outreach activities with partners and stakeholders were undertaken to facilitate cooperative relationships that would enable development of long-term alternative fuel implementation strategies for the region. These implementation strategies have been developed in conformance with the Park Service's Alternative Transportation Program (ATP) and Glacier's ongoing conversion of existing Park vehicles and equipment to alternative fuels.

The following recommendations were provided by the consultants, HNTB and EA Engineering, to facilitate continuing development of cooperative relationships and activities, between the Park and other interested parties outside the Park, for regional deployment of alternative fuels and transportation systems.

Increased Use of Alternative Fuels with Non-Road and Stationary Sources

The Park has converted its diesel-powered wheeled/tracked off-road equipment to B-20, however the patrol boat operating out of the Goat Haunt area could still potentially be converted from petroleum diesel to B-20. In addition, Park concessionaires such as the Glacier Park Boat Company that operates diesel-powered cruise boats on five of the Park's lakes, could potentially convert these boats to operate on B-20. Contractors who also operate off-road equipment in and around the Park could potentially convert that equipment to burn alternative fuels, particularly B-20, in lieu of petroleum diesel. Due to earlier air quality concerns related to wood-fired heaters, commercial and residential space heating plants within the Park are almost exclusively operated on natural gas or propane. However, the three (3) electric generators at Polebridge, that currently run on petroleum diesel, could be refitted to run on bio-diesel. In addition, privately owned heating plants or generators operated outside the Park may also be suitable for conversion to alternative fuels such as propane or biodiesel. A summary of the alternative fuel supply infrastructure in the region is provided in Appendix E. Appendix G contains a list of large stationary sources operating in the vicinity that could also be potential candidates to substitute alternative fuel for traditional fossil

fuels. Conversion of additional off-road and stationary sources could increase the demand for alternative fuels within the Park and in the surrounding region sufficiently to increase availability of these fuels and potentially enable competitive forces to reduce prices.

Designation as a "Clean Cities" Coalition

The Park should endeavor to create a coalition of public and private sector stakeholders sufficiently large, diverse and committed enough to pursue designation as a Clean Cities Coalition. A summary of state and federal incentives for deployment of alternative fuel vehicles, including the Clean Cities Program, is provided in Appendix F. Even if Clean Cities designation is not ultimately realized, following the program roadmap will make available the broadest array of options and resources for deploying alternative fuels and transportation systems in the region.

Web-based Communication Facility

As regional deployment of alternative transportation systems (ATS) evolves, a more flexible and timely form of communication than periodic stakeholder's meetings would be advantageous. Establishing an internet web page to serve as a clearinghouse for information about ongoing ATS initiatives would be a relatively low cost means of facilitating continuing outreach and two-way communication. Periodic postings could be used to apprise a wide audience (active stakeholders as well as interested parties) of current activities and developments. The web page could also be used for canvassing the same parties electronically for input, in a timely and cost-effective manner. The web page could be linked to the Glacier National Park web page and could be maintained by either the Park Service or a third party.

GTSR Intelligent Transportation Systems (ITS) Architecture –Joe Kracum

During the planning of the rehabilitation of the Going-to-the-Sun Road, several studies concluded that providing travel information and construction delay information to the visitors before and during their visits to the Park would help in mitigating the impacts to visitation during the rehabilitation. Subsequent discussions revealed that communications and data systems could be improved in the Park as well, and could be a part of an overall intelligent transportation system (ITS). In 2002, Glacier National Park prepared an ITS Vision Paper that discussed the possibility of a fiber optic cable extending the full length of the Going-to-the-Sun Road to provide the infrastructure backbone for ITS that would provide communication and data transmission along the Road for visitors and Park personnel. The information would be available on-line, at gateway communities, and when traveling on the Road. Concepts were expanded to provide enhanced transit operations and interpretative programs. The information system would address, in part, eleven of the fifteen Priority Action Strategies identified in the Socioeconomic Study for the rehabilitation of the Road.

The GTSR Intelligent Transportation Systems (ITS) Architecture Study was the next step identified in the ITS Vision Paper. The scope of this Study included the identification of the direct and indirect benefits of implementing an ITS system for rehabilitation of the Road, mitigation of visitor impacts during rehabilitation, long term interpretative programs, operations and maintenance functions, and safety. Sources, types, and extent of information were studied, along with budgetary cost estimates, a preliminary schedule, and potential funding sources for implementation. Essentially this Study determined the overall feasibility and viability of such a system. During the early part of the Study, concepts evolved into providing an enhanced communications system for Park personnel, a system that could potentially allow an earlier spring opening of the Road, and other systems that could offer expanded interpretative opportunities to the visitor. The Going-to-the-Sun Road Communications and Intelligent Transportation System, or the SunRoadITS, is the focus of this Study, and takes the ideas from the ITS Vision Paper, the studies prepared for the rehabilitation of the Road, and Park personnel, and develops them into concepts that can be used in further development, architecture, and system design.

One key stop in development of the system was to focus the ITS Architecture. This Study collected the basic information from Park personnel and assembled it to focus the architecture in accordance with the National ITS Architecture. The National ITS Architecture served as the master plan for the design, development, and implementation of ITS technologies and systems in metropolitan and rural areas. It defined the functions (such as gathering traffic data) that must be performed to implement a particular service (such as freeway or transit management), the physical entities or subsystems where these functions reside (such as the roadside or vehicle), the

information flows between the physical subsystems, and the communication requirements for the information flows (for example, wireless or wireline). While the intent of the National ITS Architecture is technology-neutral framework, fiber optic cable was the specified infrastructure for this Study.

The overall mission of implementing an information system backbone was to provide the infrastructure for communications and ITS on the Going-to-the-Sun Road. The information system backbone is a private network infrastructure consisting of a fiber optic cable along the length of the Going-to-the-Sun Road with associated wireline and wireless connections, hardware and software. The objectives developed for the project included:

- TO PROVIDE COMMUNICATIONS INFRASTRUCTURE ALONG THE GOING-TO-THE-SUN ROAD
- TO HELP MITIGATE IMPACTS FROM REHABILITATION OF THE GOING-TO-THE-SUN ROAD
- TO PROVIDE TRANSPORTATION ENHANCEMENTS ON THE GOING-TO-THE-SUN ROAD
- TO ENHANCE THE VISITOR EXPERIENCE AND SAFETY ON THE GOING-TO-THE-SUN ROAD

The concepts for the infrastructure included a buried fiber optic cable that extends from West Glacier Headquarters to Hudson Bay Station, approximately 52 miles along the Going-to-the-Sun Road. The cable would serve as the infrastructure for a private network. Laid with the cable is support wiring for power, sensing devices, radio communications, and network connections. Network connections would be made where information exchange is required. Network connections made along the Road could be housed in small underground vaults with only an unobtrusive antenna for wireless communication above the surface. Park personnel would have communications and wireless data connection at these locations, allowing their portable computers or personal digital assistants to be connected to the network. Visitors could access traveler information at facilities equipped with kiosks or on the internet. Also envisioned is traveler information available along the Road on Park-setting designed variable message signs, and in visitor vehicles, by means of highway advisory radio. Environmental monitoring devices, road sensing equipment, traffic control devices, transportation devices, surveillance equipment, information kiosks, facilities, and other devices and equipment would be hardwired to the network.

The concepts were itemized and prioritized with Park personnel into high priorities and lower priorities. High priorities are bolded in the table below. The concepts were further itemized in phases, according to when they would be implemented, for the rehabilitation effort, in the midterm, or long range.

Prioritized ITS Applications

Rehabilitation Systems	Midterm Systems	Long Range Systems
Highway Advisory Radio & Emergency Broadcast System	Road Travel Conditions	Law Enforcement Data
Traffic Monitoring & Travel Demand Strategies	Environmental Conditions	Security
Variable Message Signs	Shuttle Scheduling & Management	Fire Management
Road Condition Monitoring	Red Bus Scheduling & Management	Campground Occupancy & Reservations
Road Finder	Emergency Call Boxes	Entrance Fee Collection
Rehabilitation Construction	Regional Travel Conditions	Backcountry Permitting
Rehabilitation Traffic Control	GPS Vehicle Tracking	Bear Management System
Interpretation & Orientation	Fleet Management	In-Vehicle Messaging
Alternative Glacier NP Experiences & Regional Special Events	Facilities Conditions & Management	Lodging Reservations

The probable cost range for providing infrastructure and all high priority elements as shown above for the rehabilitation and the midterm is approximately $18 million to $20 million. This includes fiber optic cable installation, using the most reliable installation of trenching wherever possible, and using surface inlaid fiber elsewhere. All remote interface units, a traffic operations center, roadside devices, vehicle equipment, and software development are included in the cost.

The probable cost range for providing infrastructure and all high priority elements for just the rehabilitation phase was approximated at $10 million to $13 million. This includes fiber optic cable installation using surface inlaid fiber along the entire length of the Road. In this scenario, the number of locations for remote interface units has been reduced from 50 locations to 25 location. The traffic operations center is not included; however, an allowance was added to retrofit hardware into an existing facility. The number of roadside devices, vehicle equipment, and software development has been appropriately reduced for the rehabilitation phase. Preliminary budgets for the rehabilitation of the Going-to-the-Sun Road provide funding for intelligent transportation systems; however it covers only a very small portion of the high priority systems discussed in this Study. Some elements of the SunRoadITS could be deployed; however, the installation of fiber optic cable along the Road, the essential infrastructure, is well beyond the preliminary budget, and

would require additional funding sources. Potential sources for this additional funding include the stakeholders. The primary stakeholders in the SunRoadITS include: Glacier National Park; National Park Service; Federal Highway Administration; and gateway communities and businesses.

While the concepts are sound and feasible, and the benefits tremendous, the SunRoadITS as described in this Study may not be viable. The concepts of using ITS to help mitigate the rehabilitation effort, provide additional communications, and to enhance transit on the Road are all usable concepts. In discussions with Park personnel, however, the SunRoadITS as described in this Study, may be too high-tech for the environmental, cultural, and historical sensitivity of the Going-to-the-Sun Road. The experience of the Going-to-the-Sun Road and Glacier National Park may be clouded by systems normally reserved for cities.

In terms of mitigating the impacts of the rehabilitation of the Road, some of the concepts presented in this study should receive further discussion for possible implementation. These include: Highway Advisory Radio; Traffic Monitoring and Travel Demand Strategies; Variable Message Signs; Road Finder; Rehabilitation Traffic Control; Alternative Glacier NP Experiences & Special Events; and Interpretation & Orientation. The cost of the standalone systems described above should be less than $1 million. These systems could be supplemented with additional Park personnel during the rehabilitation to communicate directly with the visitors on the Road during traffic stops. This hands-on approach has great merit in providing a more natural means for communicating information along this spectacular Road.

Intelligent Transportation Systems (ITS) Deployment Plan – SAIC (not yet complete)

Project Objective

The overall goal of this project is to plan, design, and install appropriate ITS technologies to help alleviate traffic and parking congestion in Glacier Park, thereby mitigating visitor impacts during the Going-to-the-Sun Road Rehabilitation.

Project Scope

The *Glacier National Park ITS Deployment Plan* aims to identify an appropriate set of ITS applications for deployment at the Park to address visitor and park transportation needs during GTSR Rehabilitation. This study will ultimately provide technical specifications for ITS implementation and will provide a framework to guide implementation phasing decisions. In addition, the ITS Plan for Glacier Park will identify and document detailed requirements and specifications from ITS systems already deployed by the National Park Service or on federal lands to reduce design cost and development risk for the ITS applications selected by the Park.

A sampling of Park ITS priorities that have already been identified from the *ITS Architecture Focus Study* include:

- Traffic Monitoring and Travel Demand Strategies during GTSR Rehabilitation
- Parking Monitoring and Management
- Real-time Transit Information
- Construction Traffic Management and Control
- Visitor Orientation and Information Needs
- Interpretation Strategies utilizing ITS

The scope presented herein describe activities or tasks that are designed to support a systems engineering approach that evolves from identifying or confirming Park transportation needs through the selection of preferred strategies and identification of existing functional requirements. One of the main goals of the activities described in this Scope of Work is to minimize subsystem design and implementation costs. This will be done by identifying existing hardware and software functional requirements for ITS applications that have already been successfully deployed. This approach is designed to maximize the amount of funding available for equipment and system deployment with the added benefit of risk mitigation by developing requirements from proven systems.

With the completion of the *ITS Architecture Focus Study*, some prioritization of user needs has already been developed. Therefore, Early Deployment Recommendations will be developed to accelerate the development of several high priority needs directly related to Going-to-the-Sun Road construction mitigation. In addition, the plan will be structured to support and facilitate future ITS application development and deployment at the Park after the initial ITS

mitigation related to Going-to-the-Sun Road Rehabilitation. The National ITS Architecture will be used where possible to support this approach, where applicable. The National ITS Architecture provides a common vocabulary for ITS planning and is a recognized framework for mapping system structures, functions, and interconnections, thereby facilitating subsequent system analysis and implementation planning.

ITS applications rely on interconnected systems and components that automatically collect, process, and deliver information to those responsible for managing traffic, visitors, and planners. ITS applications are structured to address transportation needs and are organized into service areas such as Advanced Traveler Information Systems (ATIS) and Advanced Public Transportation Systems (APTS). These service areas are further divided into Market Packages (i.e., ITS applications) that address specific system needs such as Broadcast Traveler Information under ATIS and Transit Vehicle Tracking under APTS. The tasks described in this Scope of Work will support evaluation of ATIS, APTS, as well as Advanced Traffic Management Systems (ATMS) applications (and others as appropriate) to determine suitability for addressing the Park's immediate and long-term transportation needs. These may include, but are certainly not limited to:

- Parking management
- Interactive information (via kiosks, etc.)
- Real-time information (via Internet, etc.)
- Broadcast traveler information
- Transit traveler information
- Transit vehicle tracking
- Transit operations

The activities described in this Scope of Work will also address partnership building (especially in regard to local transit systems), public outreach, and public awareness.

This Scope of Work is comprised of the following tasks:

- **Task 1 - ITS Plan Outreach Support and Project Management**
- **Task 2 - Identify Park ITS Needs**
- **Task 3 – Infrastructure, Operations, and Financial Feasibility Analysis**
- **Task 4 – Prepare General Functional Requirements**
- **Task 5 – System Architecture Analysis**
- **Task 6 – Develop ITS Alternatives and Cost Estimates**
- **Task 7 – Evaluate and Prioritize ITS Alternatives**
- **Task 8 –Requirements and Specifications Documentation**
- **Task 9 – Final Report: Glacier National Park ITS Deployment Plan**
- **Task 10 – Assist With ITS Implementation**

Transit Implementation Plan – David Evans Associates

This section presents a summary of the proposed Glacier National Park (GNP) transit system and it provides an overview of the funding and financial plan that would support the system. GNP plans to implement transit service in 2007 as part of an overall strategy to mitigate the impacts associated with planned reconstruction of Going-to-the-Sun Road (GTSR). The plan documented in this summary report represents the culmination of an eight-month process that included input from a technical working group and project stakeholders, as well as an in-depth assessment of the technical and financial issues associated with implementing a new transit system to serve GNP.

The major steps in the study included:

· Review of existing transportation facilities, services and conditions in GNP and the surrounding communities

Development and evaluation of three overall concepts for transit service

· Selection of a preferred transit concept

· Value Analysis and Choosing By Advantages to develop and select the best options for refining the transit service concept

· Financial analysis to determine funding requirements and confirm the viability of the proposed plan

The study findings are documented in more detail in the following reports:

· Glacier National Park Existing Conditions Report

· Glacier National Park Transit Concepts Report

· Glacier National Park Transit Operations Plan

· Glacier National Park Service Delivery Options White Paper

· Glacier National Park Value Analysis/Choosing-by-Advantages Summary Report

An additional report providing an overview of appropriate transit vehicle options for the park is being drafted. The proposed transit system would provide service along GTSR from Saint Mary to the proposed transit center near Apgar Village, and along a route serving the area near the west entrance to the park, including West Glacier, the Apgar Transit Center, Apgar Village, Fish Creek Campground and a portion of US Highway 2 outside the park. The GTSR service would be divided into two routes serving each side of Logan Pass and meeting at the Logan Pass Visitor Center.

Other options considered in the *Transit Concepts Report* added service to Many Glacier, Two Medicine and East Glacier along with transit service along US 2 traversing Marias Pass. These services would expand transit access to more destinations on the east side of the park and they would provide an alternate route to connect the east and west sides of the park while avoiding the construction

zones on the alpine section of GTSR. Another concept would divide the GTSR service into three routes (Apgar Transit Center to Avalanche, Avalanche to Logan Pass, and Logan Pass to Saint Mary). This option would have the advantage of isolating the effects of construction delays to the route operating between Avalanche and Logan Pass.

The additional service on the east side of the park and over Marias Pass may be considered as an expansion of the proposed service in the future. Furthermore, if construction delays on the alpine section of GTSR become problematic, the park could operate transit service on GTSR using three routes.

A VA/CBA workshop was held at two different locations near Glacier National Park on April 28 and 29, 2005 to refine the proposed transit concept. Representatives from Glacier National Park, the Western Federal Lands Highway Division of the Federal Highway Administration (WFL/FHWA) and the Intermountain Region of the National Park Service attended the workshop. The VA/CBA explored refinements for the following aspects of the transit system:

1. Transit Routes and Schedules

2. Operating Season

3. Vehicle Type and Methods of Acquisition

4. Provisions for Vehicle Maintenance and Operating Facilities

5. Funding and Implementation Strategies

The proposed transit system reflects the results of the VA/CBA process, which identified significant cost saving opportunities while retaining the value of the transit service to visitors.

PROPOSED TRANSIT SYSTEM PLAN

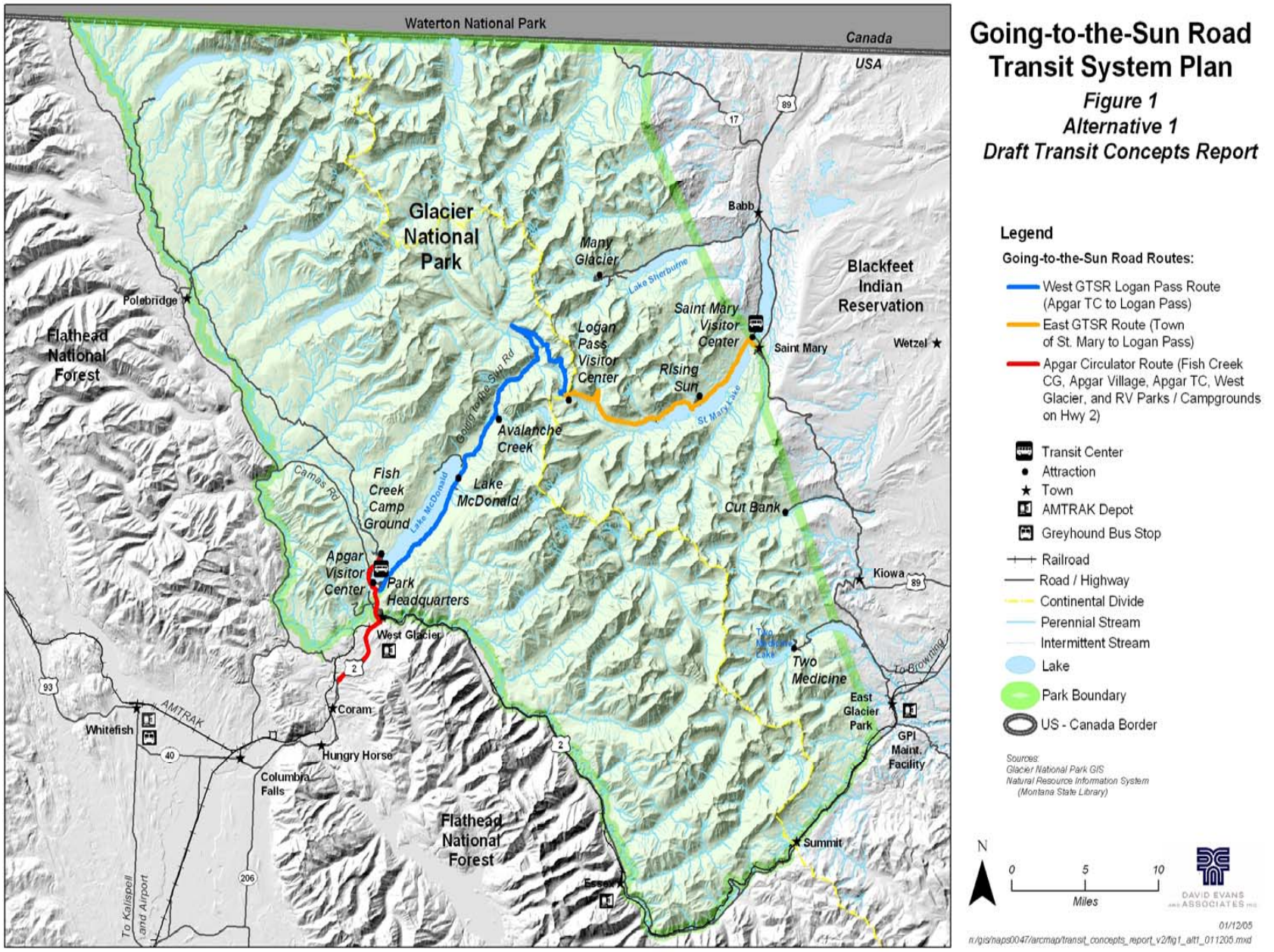
The key features of the proposed transit system are listed below. The alternatives considered during the VA/CBA and the results of the workshop are documented in *the Glacier National Park Value Analysis/Choosing-by-Advantages Summary Report.* The VA/CBA process yielded annual operating cost savings of $250,000, bus fleet cost savings of $150,000, and operating facility savings of more than $2.1 million compared to the base transit system concept.

Transit Routes and Schedules

The preferred alternative would provide transit service over GTSR via two primary routes: the West GTSR route circulating between Apgar Transit Center and Logan Pass, and the East GTSR Route circulating between the town of St. Mary and Logan Pass. (See **Figure 1: Proposed Routes**) Service on GTSR would be complemented by the Apgar Circulator feeder route, which would connect Apgar Village, Fish Creek Campground, Apgar Transit Center, West Glacier, and adjacent RV parks and campgrounds west of the park approximately three miles on US Highway 2. The Apgar

Circulator route would enhance the GTSR routes by encouraging transit use on the part of overnight campers and lodging guests, who could leave their private vehicles at their overnight accommodations. The Apgar Circulator route would make efficient use of parking at existing developed sites, thereby reducing the need for parking at the Apgar Transit Center. The VA/CBA process identified a refinement to the Apgar Circulator Route from its original definition in the *Concepts Report*. The preferred route was shortened so that it could be operated with two buses, rather than three.

The two GTSR routes and the circulator would all operate on 30-minute headways, allowing for timed transfers at Logan Pass between the two GTSR routes, and at Apgar Transit Center between the West GTSR route and the Apgar Circulator route. The 30-minute headways on the proposed routes are consistent with the transit service called for in the Going-to-the-Sun Road Environmental Impact Statement.


Going-to-the-Sun Road
Transit System Plan
Figure 1
Alternative 1
Draft Transit Concepts Report
Waterton National Park
Canada
USA
Glacier National Park
Many Glacier
Lake Sherburne
Babb
Blackfeet Indian Reservation
Polebridge
Flathead National Forest
Logan Pass Visitor Center
Saint Mary Visitor Center
Saint Mary
Wetzel
Rising Sun
Going-to-the-Sun Rd
St Mary Lake
Avalanche Creek
Fish Creek Camp Ground
Lake McDonald
Camas Rd
Cut Bank
Apgar Visitor Center
Park Headquarters
West Glacier
Kiowa
Two Medicine
To Browning
East Glacier Park
GPI Maint. Facility
Coram
Whitefish
AMTRAK
Hungry Horse
Columbia Falls
Flathead National Forest
Summit
Essex
To Kalispell and Airport
Legend
Going-to-the-Sun Road Routes:
West GTSR Logan Pass Route (Apgar TC to Logan Pass)
East GTSR Route (Town of St. Mary to Logan Pass)
Apgar Circulator Route (Fish Creek CG, Apgar Village, Apgar TC, West Glacier, and RV Parks / Campgrounds on Hwy 2)
Transit Center
Attraction
Town
AMTRAK Depot
Greyhound Bus Stop
Railroad
Road / Highway
Continental Divide
Perennial Stream
Intermittent Stream
Lake
Park Boundary
US - Canada Border
Sources:
Glacier National Park GIS
Natural Resource Information System
(Montana State Library)
N
0
5
10
Miles
DAVID EVANS AND ASSOCIATES
01/12/05
n:/gis/maps0047/arcmap/transit_concepts_report_v2/fig1_alt1_011205.mxd

Operating Season and Hours of Operation

The preferred alternative for transit service would provide service beginning on July 1, with the final day of service being on Labor Day. The operating season would range from 63 days to 69 days. This operating season corresponds to the time period of heaviest visitation to Glacier National Park. The preferred operating season was modified through the VA/CBA process from the original plan to operate from June 15 to September 15. Shortening the operating season would reduce costs substantially and it would provide transit service when mitigation is needed the most. Average traffic volumes on GTSR during late June and early September range from 20% to 40% below the peak season traffic volume, indicating that mitigation of construction impacts is less important during these times.

The first buses on GTSR in the morning would leave for Logan Pass from the Apgar Transit Center at 7:15 am and from Saint Mary at 8:00 am, arriving at Logan Pass about 8:45 am. The last buses would leave Logan Pass in each direction at 9:30 pm, allowing visitors adequate time to make most of the popular hikes during their visit. The Apgar Circulator Route schedule would be designed to meet the first eastbound and last westbound buses at the Apgar Transit Center. Service on US 2 would start at 7:10 am and the last bus would complete its run from Apgar Transit Center to the US 2 end of line at about 11:30 pm.

Vehicles

The preferred alternative includes a fleet of 17 vehicles to be purchased by NPS (rather than leased or provided by a contractor). The vehicles would be heavy-duty transit buses less than 30 feet long and approximately 96 inches wide (not including mirrors). The buses would be designed to provide access for users in wheelchairs. A low-floor bus would be preferred due to the easier boarding and alighting offered to all passengers. A specific bus manufacturer and model would be determined through a competitive procurement. Propulsion and fuel systems for the vehicles also would be determined through the competitive procurement process. Vehicles with the most cost-effective combination of low emissions, low noise, high fuel economy and use of renewable energy resources would be selected. Based on the available fuel types and infrastructure in and near the park, bio-diesel and propane are the most practical options for alternative fuels.

The physical dimensions of the buses were selected to allow safe operation along the narrow alpine section of GTSR, which has tight turns. A fleet composed of a single bus type is desired so that maintenance costs and spare parts inventories are minimized. A single type of bus also would promote effective marketing of the service and easy recognition by visitors of the park-managed buses. Purchasing the buses would afford the best opportunity to obtain the desired features (compared to leasing) and would minimize life-cycle costs (compared to having a contractor provide the vehicles). The

preferred alternative leaves open the possibility of sharing buses with other entities whose seasonal demands complement those of Glacier National Park. For example, Yellowstone is planning to purchase six snow coaches for winter use. These vehicles could be converted for travel along paved roads at Glacier National Park during the summer. Universities in the region also could possibly share vehicles used at Glacier in the summer.

Vehicle Maintenance and Operations Facilities

A new vehicle wash facility, along with the required water treatment equipment, would be constructed in the Headquarters area of the park. Buses would be parked overnight at the Apgar Transit Center and at the Saint Mary Visitor Center. It is assumed that buses operating on the East GTSR route would be shifted to the West GTSR route to facilitate cleaning. Bus drivers would report to Apgar Transit Center or Saint

Mary Visitor Center to begin their shifts. Employee parking would be added at Apgar Transit Center and Saint Mary. It is assumed that periodic inspections, maintenance (like oil changes) and repairs would be conducted off-site.

Funding and Implementation Strategy

Funding for the proposed transit system would be provided by a combination of Federal Lands Highway Program funds (for transit stops and for the road-related aspects of the transit centers), GTSR Mitigation Funds (for purchase of buses, construction of required maintenance facilities, construction of the transit center building and operations), and a transportation fee to be collected as part of the park entrance fee. The required transportation fee, assumed to be collected beginning in 2007, is estimated to be $5.00 per vehicle initially, with the fee increasing to $7.00 per vehicle in 2009. The service would be implemented using a service contract. The service contract approach offers the best advantages to the park in terms of simplicity, flexibility and cost. A specific service contractor would be selected through a competitive procurement process. After initial implementation of the transit system, Glacier National Park would be able to seek opportunities for partnerships with local entities. Partnerships could be used to expand service, increase the range of potential funding sources and make the most efficient use of the vehicle fleet.

COST ANALYSIS AND FUNDING PLAN

Costs for the Glacier National Park Transit System Plan have been estimated based on pre-schematic design of the required facilities and on typical unit costs for bus services and vehicles from other parks and from similarly scaled operations in small communities. Life cycle costs for the various alternatives were calculated assuming a 20-year project life. The proposed financial plan for the project assumes operation for eight years. Initial costs, ongoing operating and maintenance costs, major overhauls and replacement costs were considered in developing the cost estimates. A final funding plan, reflecting the costs of the combined elements of the preferred

alternative was then developed. The funding plan was assessed using a cash flow model developed by David Evans and Associates. The funding plan was also analyzed using the National Park Service's standard financial *pro-forma* developed by the Volpe National Transportation Systems Center.

Cost Assumptions

The following assumptions were used to develop the life-cycle cost estimates:

1. Transit operations would be conducted seven days a week and would operate on the same schedule throughout the operating season.
2. During the off-season buses would be stored at no additional cost to the park or the contractor.
3. Buses would be replaced after 15 years of service for heavy duty buses and after 10 years of service for light duty vehicles.
4. Transmission overhauls were assumed every five years for heavy duty buses. Major engine overhauls were assumed after 10 years of operation for these buses. Light duty buses were assumed to have a major overhaul every three years.
5. Operating costs for transit were assumed to be $65 per hour, inclusive of all labor, maintenance, fuel and materials. Operating costs for the ITS system, estimated by others, were assumed to be $62,500 per year. Facility maintenance costs for the Apgar Transit Center were estimated at 2.5% of construction cost per year. The funding analysis in the Volpe *pro-forma* assumed $55 dollars per hour for transit operating costs.
6. The life cycle cost analysis was conducted in current dollars. No inflation factors were applied in the comparison of alternatives. The final funding plan for the service assumes an inflation rate of 2.5% per year for capital and operating costs.
7. Capital costs for the project included the Apgar Transit Center, ITS, bus stops, vehicles, and a vehicle wash facility. Construction cost estimates for the transit center, ITS and the bus stops were supplied by others. Cost estimates for the vehicle wash facility were less than Class C level. The following factors were applied to the direct construction cost (unit prices from the Class C Estimating Guide):

Overhead and Profit – 40%, General Conditions – 8%, Design Contingency – 20%. The resulting Net Construction Cost was factored as follows: Park Factor = 10%, Construction Supervision – 8%, Construction Contingency – 10%, Pre-Design, Supplemental and Design Services 17%.

8. A discount rate of 5% was used for calculating the Net Present Value of future costs for the life cycle cost analysis.

Capital and Operating Costs

The cost of the required bus fleet was estimated using an average cost of $150,000 per vehicle for heavy-duty transit buses. A fleet of 17 buses is required. The estimated cost for the Apgar Transit Center was $5.8 million and the improvements to other bus stops

were estimated at $1.0 million (by others). The ITS system capital cost was estimated at $990,000 (by others). At $65 per hour the estimated operating cost per year for the transit system alone would be about $777,000 in 2005 dollars. Adding operating costs for ITS and for facility maintenance for the Apgar Transit Center would bring the total estimated operating cost per year to $945,600 per year in 2005 dollars. Using the Volpe base assumption of $55.00 per hour for transit operating costs yields an estimated total operating cost of $827,100 per year in 2005 dollars.

NEXT STEPS

Upon approval to proceed with the proposed transit service concept, the following steps are required to implement the service in 2007:

1. Complete design of the required passenger facilities (Apgar Transit Center, Satin Mary Visitor Center and other bus stops). Conduct necessary coordination activities for bus stops outside Glacier National Park. Develop procurement documents and construct the improvements.
2. Develop schematic, concept, design development and construction documents for the wash facility at Headquarters. Conduct any required clearance related to the historic district. Develop procurement documents and construct the improvements.
3. Develop specifications and procurement documents for the required bus fleet. Conduct a competitive procurement process (perhaps through the General Services Administration) and order the buses early enough to allow design, assembly, testing and acceptance to occur prior to the first operating season.
4. Develop a marketing plan for the service, including outreach to local lodging, camping and other businesses.
5. Develop procurement documents for the service contract. Conduct the competitive procurement for the service contract early enough to allow selected contractor to mobilize, identify required facilities and services outside the park and conduct hiring and training for employees.
6. Conduct required steps to implement the proposed transportation fee.
7. Publicize the new service.
8. Continue outreach to the general public and project stakeholders.
9. Develop and print public information materials. Implement web-based and other public information.
10. Coordinate implementation of the transit and ITS systems.
11. Conduct required testing of integrated systems and facilities.
12. Monitor and oversee the service contractor and ITS operations.
13. Evaluate operation and make appropriate adjustments for future year operations.

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Chapter 4: Transportation Demand Management Initiatives

- Hiker's Shuttle Operational Improvements
- New Red Bus Employee Shuttle
- Ride-matching Database
- Climate Friendly Parks Initiative
- Other Transportation Activities

Hiker's Shuttle Operational Improvements

Glacier Park Incorporated (GPI), the park's largest concessions contract, is contractually required to provide minimal shuttle service in the Park. They run a two-bus hiker shuttle that provides service on Going-to-the-Sun Road every 2 to 5 hours. The hiker shuttle is operated between July 4th and Labor Day and carries an average of 25 passengers a day. The Park does not subsidize the shuttle, so the shuttle is priced to be self-supporting. Fares range between $8 and $24 each way and do not include Park entrance fees. The Historic Red Buses are utilized for guided tours only, and do not offer point-to-point service to visitors. Tours range from about $22 to $84, depending on the length of the tour. Approximately 250 visitors ride the red buses per day. I worked with GPI and park staff to improve current Hiker's Shuttle Service. By identifying system inefficiencies, the schedule could be tightened to improve the shuttle frequencies. In addition, the shuttle was expanded to improve park coverage. Several marketing techniques were also improved. A new signage program included schedules and maps at bus stops, a brochure makeover improved schedule readability, and a greater web presence helped visitors learn about the system. Door-to-door outreach to local businesses and park/concessionaire staff helped educate them on how to encourage visitor use of the shuttle system. All these improvements were implemented utilizing existing

15 passenger van utilized for the Hiker's Shuttle

resources. After the improvements were implemented, ridership on the shuttle doubled in the first month of operation.

New Red Bus Employee Shuttle

The Employee Shuttle is a Glacier National Park Program to provide safe, economic and reliable transportation of employees to and from work under Title 16 of the US Code. Title 16 provides for the transportation of employees and their families located at isolated areas of the national park system that are not adequately served by commercial transportation and such transportation is incidental to official transportation services (US Code Title.16 Ch 1, Sub Ch I, Sec 1a-2). A related federal benefit and endorsement of the program is identified under DOI Guidelines for Participation in the Transportation Fringe Benefit Program. Most GNP employees commute from between 15 to 50 miles one way to work. This remote, rural area does not have commercial transportation available as a transportation option. In addition, the December 2003 Climate Friendly Parks meeting identified an employee shuttle as a valuable initiative addressing atmospheric emissions in and around the park. Finally, the transit system planning and development in support of GTSR rehabilitation-mitigation have supported the emergence of a variety of resources and opportunities that have led to an operational concept for an employee shuttle and an experimental period to evaluate the feasibility of the concept.

A critical enabling factor for this program at Glacier is the completion of a one dollar per year lease agreement between GNP and the Propane Consortium (PROCON) for an innovative prototype, propane powered, ADA compliant bus to GNP. This bus has supported a variety of mitigation related activities since its arrival at Glacier in July 2004, and remains available for use at GNP management discretion throughout the year. It has proven to be a spacious and effective “rolling meeting room” during site visits and other support of GTSR rehabilitation and other park projects. Continued operation in a variety of passenger carrying modes is a cost effective evaluation method with the residual benefits of providing a clean, safe, and very economical transportation capability for GNP operations including the employee shuttle.

The bus requires a Commercial Driver License (CDL) with Chauffer endorsement to operate with passengers. Several GNP employees are either fully or partially qualified to drive the bus. The employee shuttle is using volunteer drivers, who receive a “one for one pass” for every trip they drive as an incentive. Several options exist for operating the bus during duty hours but all require a qualified and available operator. Current options include coordinating for use through existing operators, qualifying additional operators, hiring a dedicated operator or transitioning the bus to one of the concessionaires.

Current Status:

- A “reasonable break even fee” was established at $1 per ride, with a first round-trip free as an additional incentive. Volunteers came forward to handle the purchase of “punch cards” to allow for flexible ridership as well as efficient accountability of riders ($20 / 20 rides) and operate the bus during the trail period. So far over 20 employees have participated in the program. The shuttle has averaged about 9 riders per day, varying between 4 and 15 per ride. Some potential riders have expressed concern over the single route / schedule, unknown status following the trial period and lack of personal flexibility as a result of riding the bus. The riders who have participated have been overwhelmingly supportive, for comfort, safety, setting an example of environmental awareness and comradeship reasons.
- The bus has performed well mechanically with minor issues being documented and sent back to PROCON to assist in providing them the information needed to improve future busses. Refueling has proven to be straight forward and readily available. The bus has averaged about 5 mpg (equivalent).
- The most significant current issue is whether or not GNP intends to continue shuttle operations. The initial trial period was extended. Several possible options exist for cost effective bus operations taking into consideration seasonal uses. The bus could continue to support the employee shuttle, transition to supporting daily park operations such as employee transport to major work centers such as Logan Pass, daily East –West side transport, and feeder loop transport in and around the West Glacier / HQs / Apgar areas. The bus could also be assigned to a concessionaire such as GPI to augment existing visitor transportation such as the hiker shuttle. Other options may exist that have not emerged yet.

Historic Red bus, Electric Hybrid Prototype, and New Red Bus

Summary:

The experimental period for the Employee shuttle has been well received and supported and ridership is anticipated to remain at current levels or grow if continued. Ridership coupled with volunteer drivers generally supports a break even operation, assuming maintenance costs are provided out of park maintenance funds and are comparable to a typical government vehicle in its class. Especially during the winter months the bus provides a valuable service for employees adding to the overall safety of employees, sets an example of environmental awareness for the Gateway communities and is available under the current circumstances at very low or no cost to GNP. GNP management level support is essential to ensure the bus remains a valuable resource for the park.

Ride-matching Database

In an effort to reduce single-occupancy work trips, a web-based ride-matching database was developed. The website application allowed park employees to enter in a planned one-time or ongoing trip, and other employees could search the database by origin, destination, and/or date to determine if they can find a match for a needed ride. The database was also utilized for an informal courier service if employees needed items picked up or dropped off. This first phase was developed with the intention of expanding it to commuter ride-matching. This initiative stemmed from an effort for park employees to "do their part" in helping reduce congestion on Going-to-the-Sun Road.

Climate-Friendly Parks Initiative

A workshop held on Dec. 9th & 10th, 2003, entitled, "Climate Friendly Parks: Moving from Knowledge to Action," was a part of the Green Parks Partnership Program - a collaboration with Waterton-Glacier International Peace Park; the National Park Service, Washington, D.C. Headquarters; and the Environmental Protection Agency.

Key issues the workshop addressed were: 1) what is known and not known about the impacts of climate change in an understandable language, 2) how park resources are affected by climate change, 3) what sustainable programs have already been initiated at Waterton Lakes and Glacier National Parks, and 4) what further actions can be taken at individual and operational levels to reduce greenhouse gas emissions and increase the sustainability of the parks. The overall goal of the workshop was to make Glacier Park a model of excellence in sustainable practices such as climate-friendly design and development.

Transportation was identified as one of the key functional areas to form an action plan in an effort to reduce greenhouse gas emissions. During the breakout sessions of the workshops, an action plan was developed that included many of the programs that were

implemented over the Transportation Scholar period. For example, the red bike program, ride-matching database, and employee shuttle were all identified as action items from the transportation workgroup of the Climate Friendly Parks Initiative.

Other Transportation Activities

-Hosted the TRB Task Force on Transportation Needs of National Parks and Public Lands Mid-Year Meeting, July 2004

-Developed PMIS statements for Glacier Park Alternative Transportation Program Projects – was funded ~$200,000 for Transit Implementation Plan

-Arranged initial review/testing of the "New Red Bus" at Glacier National Park.

-Applied Quickzone software to Going-to-the-Sun Road, innovative modeling software that predicts wait times at construction work zones given various inputs- traffic volumes, work zone length, etc.

-Assisted in developing University of Montana social research project to establish baseline data on traffic, parking, and visitor use at key park pullouts. Data will be collected after transit is implemented to determine how shuttle service will change how visitors visit the park

-Represented Glacier National Park in Flathead County's Transportation Working Committee, sponsored by the local chamber of commerce. Presented Glacier's transportation issues/initiatives annually at "Leadership Flathead," a local leadership program.

-Assisted Park and consultants in site planning and development of the Apgar Transit Center.

Glacier's Transportation Scholars, Susan Law and Anne Dunning, installing traffic counters at Logan Pass

Appendix A: Articles on Glacier Transportation Scholar Work

"Red Bikes Join Red Buses in Glacier," Daily Interlake, July 12, 2004

"Park Starts Red Bike Program," Hungry Horse News, July 10, 2004

"All Roads Lead to a National Park," GoParks, Winter 2002-03, Vol. 3, No. 2

"Scholars Grow in the National Parks," TR News, July-August 2004, No. 233